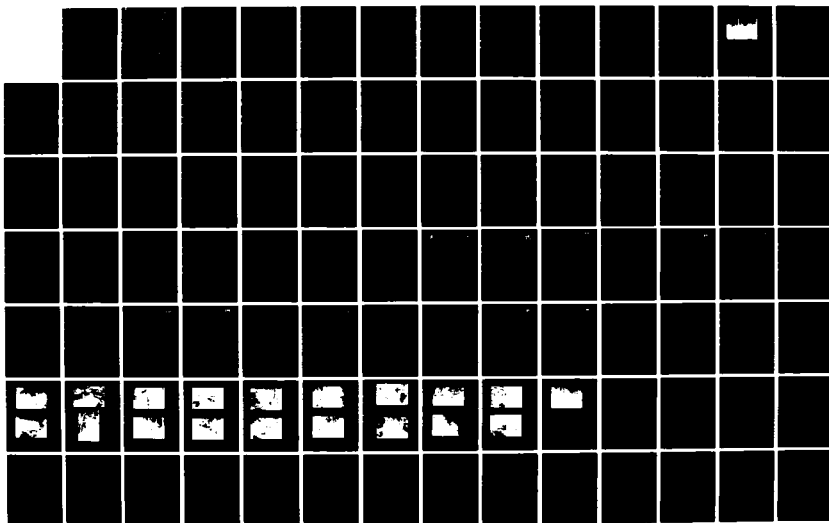
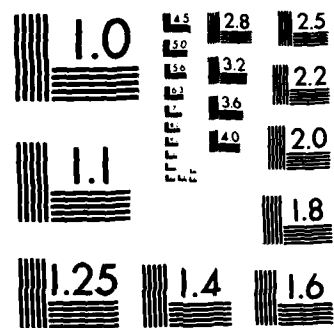


NATIONAL PROGRAM FOR INSPECTION OF NON-FEDERAL DAMS NEW 1/2  
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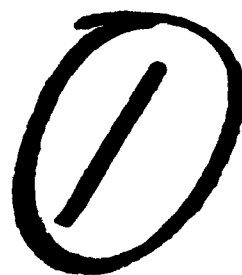




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THAMES RIVER BASIN  
DUDLEY, MASSACHUSETTS



NEW POND DAM  
MA 00113

PHASE I INSPECTION REPORT  
NATIONAL DAM INSPECTION PROGRAM

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DEPARTMENT OF THE ARMY  
NEW ENGLAND DIVISION, CORPS OF ENGINEERS  
WALTHAM, MASS. 02154

MARCH 1979

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DEPARTMENT OF THE ARMY  
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REPLY TO  
ATTENTION OF:

NEDED

MAY 29 1979

Honorable Edward J. King  
Governor of the Commonwealth of  
Massachusetts  
State House  
Boston, Massachusetts 02133

Dear Governor King:

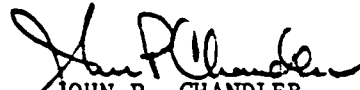
I am forwarding to you a copy of the New Pond Dam Phase I Inspection Report, which was prepared under the National Program for Inspection of Non-Federal Dams. This report is presented for your use and is based upon a visual inspection, a review of the past performance and a brief hydrological study of the dam. A brief assessment is included at the beginning of the report. I have approved the report and support the findings and recommendations described in Section 7 and ask that you keep me informed of the actions taken to implement them. This follow-up action is a vitally important part of this program.

A copy of this report has been forwarded to the Department of Environmental Quality Engineering, the cooperating agency for the Commonwealth of Massachusetts. In addition, a copy of the report has also been furnished the owner, Stevens Linen Associates, Inc., Box 220, Webster, Massachusetts 01570, ATTN: Mr. Robert Javery, Plant Engineer.

Copies of this report will be made available to the public, upon request, by this office under the Freedom of Information Act. In the case of this report the release date will be thirty days from the date of this letter.

I wish to take this opportunity to thank you and the Department of Environmental Quality Engineering for your cooperation in carrying out this program.

Sincerely yours,

  
JOHN P. CHANDLER  
Colonel, Corps of Engineers  
Division Engineer

Incl  
As stated

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NEW POND DAM  
MA 00113

THAMES RIVER BASIN  
DUDLEY, MASSACHUSETTS

PHASE I INSPECTION REPORT  
NATIONAL DAM INSPECTION PROGRAM

PHASE I INSPECTION REPORT  
NATIONAL DAM INSPECTION PROGRAM

Identification No.: MA 00113  
Name of Dam: NEW POND DAM  
Town: DUDLEY  
County and State: WORCESTER COUNTY, MA  
Stream: TRIBUTARY OF FRENCH RIVER  
Date of Inspection: 14 SEPTEMBER and 20 SEPTEMBER 1978

BRIEF ASSESSMENT

New Pond Dam consists of two earthen embankments, one to the north and one to the south of the access road to the dam. The southerly embankment, considered the main dam, contains a masonry spillway and an abandoned outlet works. The northerly embankment is considered a separate dike. Each of the embankments is approximately 400 feet long. The dam has a height of approximately 20 feet, while the dike has a height of approximately 12 feet.

The structures are in fair condition. The embankments are heavily overgrown with trees and bush. Seepage or evidence of seepage was observed at both embankments. The outlet structure, which serves as the reservoir drain, is inoperative. The spillway has a limited capacity.

Based on the hazard potential downstream of the dam and in accordance with Corps of Engineers Guidelines, this dam is classified as having a low hazard potential. A 100 year flood was selected as the spillway test flood in accordance with Corps of Engineers Guidelines for "small" dams of "low" hazard. Hydraulic analysis indicates the test flood outflow at the dam would be approximately 580 cfs. The spillway can only pass approximately 17 percent of the test flood before overtopping of the embankments would occur. At test flood peak discharge, the average height of water overtopping the dam and dike would be approximately four inches.

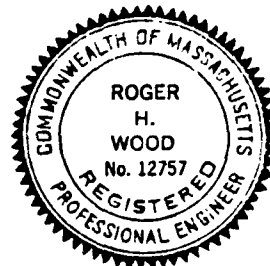
It is recommended that detailed investigations be made to determine required modifications to increase spillway capacity, to determine the effect of seepage at the dam, to determine the geometry of the embankments and, if necessary, the character of embankment materials to check the stability of the dam, and to determine the measures required to make the reservoir drain operational. Remedial measures recommended are the cleaning of trees and brush from the embankments, the filling of eroded areas, the replenishment of riprap at embankment upstream face, the replacement of fallen stones from masonry walls, the reshaping of the embankments to provide uniform freeboard and permit vehicle access, and the removal of debris from both spillway and outlet works channels. It is recommended that the investigations

and remedial measures be accomplished within one year of receipt of the report by the Owner. In addition, it is recommended that the Owner establish formal operational procedures, maintenance program, emergency procedures plan and warning system and program of annual technical inspections.

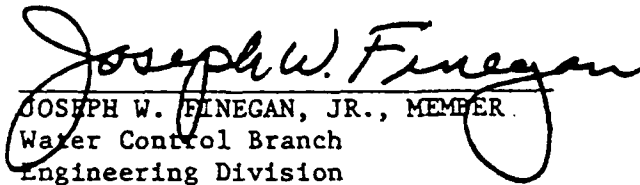
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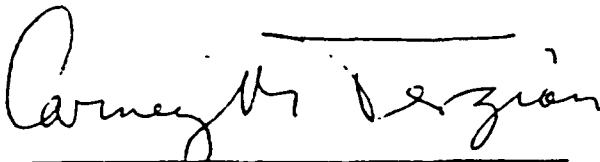
*Roger H. Wood*

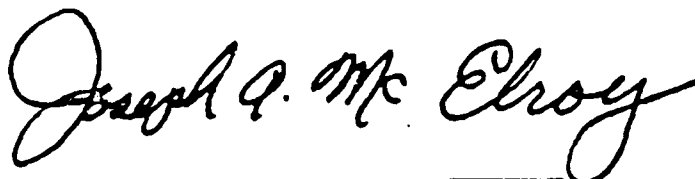
Roger H. Wood  
Vice-President



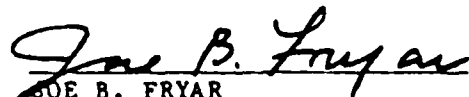
This Phase I Inspection Report on New Pond Dam has been reviewed by the undersigned Review Board members. In our opinion, the reported findings, conclusions, and recommendations are consistent with the Recommended Guidelines for Safety Inspection of Dams, and with good engineering judgment and practice, and is hereby submitted for approval.

  
JOSEPH W. FINEGAN, JR., MEMBER  
Water Control Branch  
Engineering Division

  
CARNEY M. TERZIAN, MEMBER  
Design Branch  
Engineering Division

  
JOSEPH A. MCELROY, CHAIRMAN  
Chief, NED Materials Testing Lab.  
Foundations & Materials Branch  
Engineering Division

APPROVAL RECOMMENDED:

  
JOE B. FRYAR  
Chief, Engineering Division



## PREFACE

This report is prepared under guidance contained in the Recommended Guidelines for Safety Inspection of Dams, for Phase I Investigations. Copies of these guidelines may be obtained from the Office of Chief of Engineers, Washington, D.C. 20314. The purpose of a Phase I Investigation is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the general condition of the dam is based upon available data and visual inspections. Detailed investigation, and analyses involving topographic mapping, subsurface investigations, testing, and detailed computational evaluations are beyond the scope of a Phase I Investigation; however, the investigation is intended to identify any need for such studies.

In reviewing this report, it should be realized that the reported condition of the dam is based on observations of field conditions at the time of inspection along with data available to the inspection team. In cases where the reservoir was lowered or drained prior to inspection, such action, while improving the stability and safety of the dam, removes the normal load on the structure and may obscure certain conditions which might otherwise be detectable if inspected under the normal operating environment of the structure.

It is important to note that the condition of a dam depends on numerous and constantly changing internal and external conditions, and is evolutionary in nature. It would be incorrect to assume that the present condition of the dam will continue to represent the condition of the dam at some point in the future. Only through continued care and inspection can there be any chance that unsafe conditions be detected.

Phase I Investigations are not intended to provide detailed hydrologic and hydraulic analyses. In accordance with the established Guidelines, the test flood is based on the estimated "probable maximum flood" for the region (greatest reasonably possible storm runoff), or a fraction thereof. Because of the magnitude and rarity of such a storm event, a finding that a spillway will not pass the test flood should not be interpreted as necessarily posing a highly inadequate condition. The test flood provides a measure of relative spillway capacity and serves as an aide in determining the need for more detailed hydrologic and hydraulic studies, considering the size of the dam, its general condition and the downstream damage potential.

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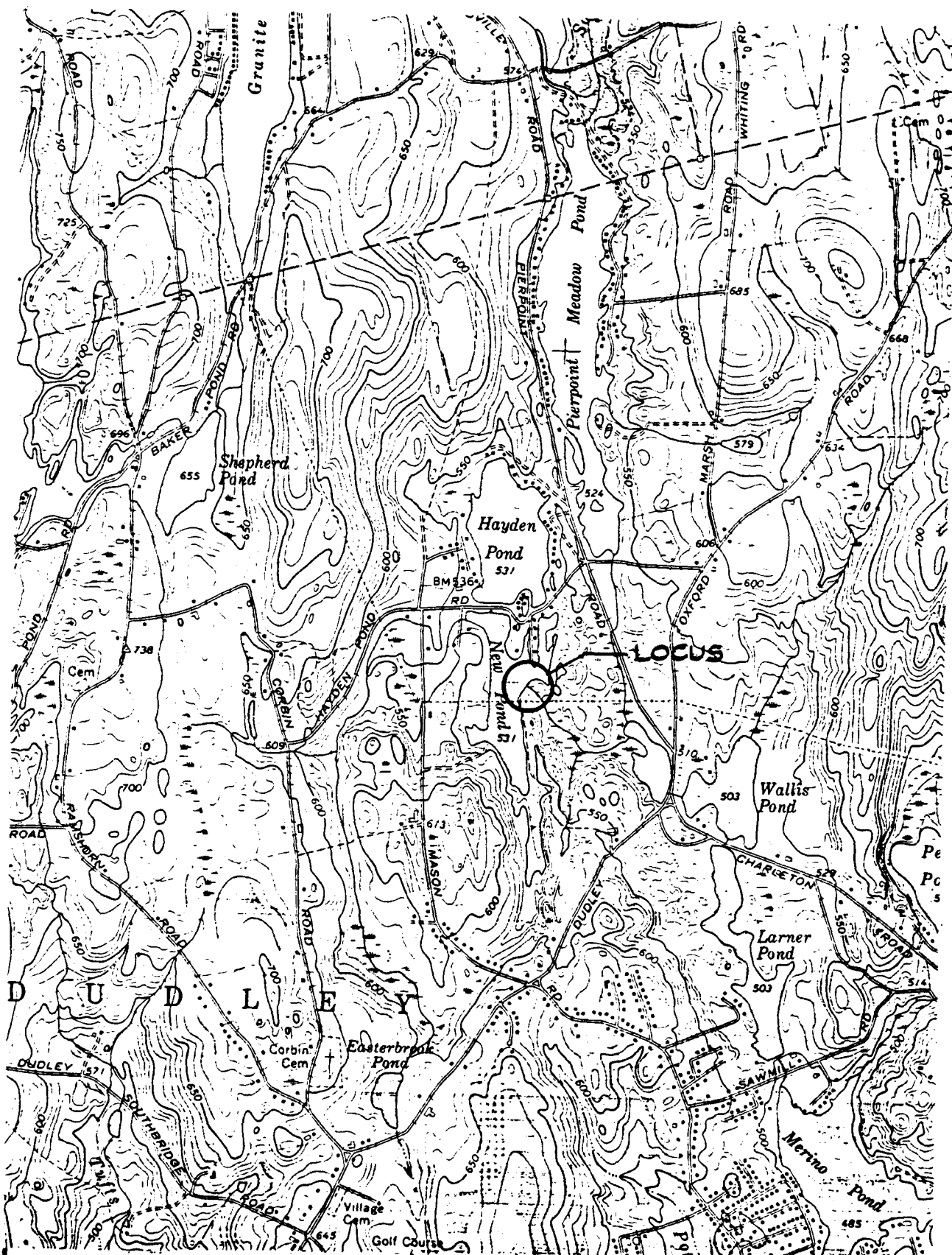
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REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER MA 00113	2. GOVT ACCESSION NO. A145 347	3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle) New Pond Dam  NATIONAL PROGRAM FOR INSPECTION OF NON-FEDERAL DAMS		5. TYPE OF REPORT & PERIOD COVERED INSPECTION REPORT
7. AUTHOR(s) U.S. ARMY CORPS OF ENGINEERS NEW ENGLAND DIVISION		6. PERFORMING ORG. REPORT NUMBER
9. PERFORMING ORGANIZATION NAME AND ADDRESS		8. CONTRACT OR GRANT NUMBER(s)
11. CONTROLLING OFFICE NAME AND ADDRESS DEPT. OF THE ARMY, CORPS OF ENGINEERS NEW ENGLAND DIVISION, NEDED 424 TRAPELO ROAD, WALTHAM, MA. 02254		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS
14. MONITORING AGENCY NAME & ADDRESS (if different from Controlling Office)		12. REPORT DATE March 1979
		13. NUMBER OF PAGES 75
		15. SECURITY CLASS. (of this report)  UNCLASSIFIED
		15a. DECLASSIFICATION/DOWNGRADING SCHEDULE
16. DISTRIBUTION STATEMENT (of this Report)  APPROVAL FOR PUBLIC RELEASE: DISTRIBUTION UNLIMITED		
17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)		
18. SUPPLEMENTARY NOTES Cover program reads: Phase I Inspection Report, National Dam Inspection Program; however, the official title of the program is: National Program for Inspection of Non-Federal Dams; use cover date for date of report.		
19. KEY WORDS (Continue on reverse side if necessary and identify by block number) DAMS, INSPECTION, DAM SAFETY, Thames River Basin Dudley, Massachusetts		
20. ABSTRACT (Continue on reverse side if necessary and identify by block number) New Pond Dam consists of two earthen embankments, ont to the north and one to the south of the access road to the dam. Each of the embankments is approximately 400 feet long. The dam has a height of approximately 20 feet, while the dike has a height of approximately 12 feet. The structures are in fair condition. Based on hazard potential, this dam is classified as having a low hazard potential. A 100 year flood was selected as the spillway test flood. The dam is classified as a "small" dam.		



1. OVERVIEW OF DAM FROM RIGHT ABUTMENT (MARCH 1979).



DAM: NEW POND

IDENTIFICATION NO.: MA.00113



LOCATION MAP  
USGS QUADRANGLE  
WEBSTER, MA.  
SCALE: 1" = 2000'

NATIONAL DAM INSPECTION PROGRAM  
PHASE I INSPECTION REPORT  
NEW POND DAM  
MA 00113

SECTION 1: PROJECT INFORMATION

1.1 General

- a. Authority - Public Law 92-367, 8 August 1972, authorized the the Secretary of the Army, through the Corps of Engineers, to initiate a national program of dam inspection throughout the United States. The New England Division of the Corps of Engineers has been assigned the responsibility of supervising the inspection of dams within the New England Region.

Camp Dresser & McKee Inc. has been retained by the New England Division to inspect and report on selected dams in the State of Massachusetts. Authorization and notice to proceed was issued to Camp Dresser & McKee Inc. under a letter of 12 July 1978, from Colonel John P. Chandler, Corps of Engineers. Contract No. DACW 33-78-C-0354 has been assigned by the Corps of Engineers for this work. Haley and Aldrich, Inc. has been retained by Camp Dresser & McKee Inc. for the soils and geological portions of the work.

- b. Purpose - The primary purpose of the investigation is to:
- (1) Perform technical inspection and evaluation of non-Federal dams to identify conditions which threaten the public safety and thus permit correction in a timely manner by non-Federal interests.
  - (2) Encourage and assist the States to initiate quickly effective dam safety programs for non-Federal dams.
  - (3) Update, verify and complete the National Inventory of Dams.

1.2 Description of Project

- a. Location - New Pond Dam is located on a tributary of the French River, approximately 1,400 feet west of Pierpoint Road in the town of Dudley, Massachusetts, as shown on the report's location map. The dam is located on the east side of New Pond, approximately 900 feet south of the north end of the pond. Waters impounded by the dam are called New Pond and Hayden Pond, a causeway dividing the two. Flow from New Pond passes through a pond known locally as Mosquito Pond and then into Wallis Pond.

- b. Description of Dam and Appurtenances - New Pond Dam consists of two irregularly aligned earth embankments, each a little over 400 ft long. The main dam has roughly an east-west orientation; the right half of the dam has a dry-stone masonry downstream face, a concrete overflow spillway and an abandoned stone masonry gated outlet. The dike embankment extends to the north from the left end of the dam. A sketch plan and sections prepared from Phase I inspection records are shown in Appendix C.

The main dam has a maximum height of about 20 ft at the gate location. The cut-stone masonry portion of the downstream face is nearly plane and vertical, but the earth slope portion varies from as steep as 1.5 horizontal to 1 vertical to approximately 3 to 1. The above-water portion of the upstream face slopes irregularly at approximately 1 to 1, and has a cobble slope protection that is partially obscured by roots and brush. The crest and slopes of the main dam are generally irregular and wooded.

The dike embankment is similar to the main dam, but has a maximum height of about 12 ft above a downstream pond. The wooded downstream slope is generally flatter than the slope at the main dam, being typically about 3 or 4 to 1, and the upstream slope cover varies from cobbles and boulders to cobbles and gravel. The crest and slopes of the dike are also generally irregular and wooded.

- c. Size classification - The height of the dam is approximately 20 ft and the estimated total storage capacity at the top of the embankment is 500 acre feet. According to guidelines established by the Corps of Engineers, the dam is classified in the small category, based on both storage capacity and height of dam.
- d. Hazard Classification - The results of the dam failure analysis indicate that a flood wave resulting from a failure of the dam embankment would cause only minor water damage to one home adjacent to the downstream pond, and the Dudley Street-Oxford, Charlton Road intersection would be overtopped by approximately two feet of water. There is no significant potential for loss of life indicated. It is therefore recommended that New Pond Dam be classified as having a low hazard potential.
- e. Ownership - The dam has been owned by Stevens Linen Associates for the last 39 years. The previous owner was J.P. Stevens, Inc. The present owners' address is: Stevens Linen Associates, Inc., Box 220, Webster, Massachusetts, 01570 (phone 617/943-0600). Mr. Robert Javery, Plant Engineer, at the above address is the owners' representative.



- f. Operator - Operation of the dam is the responsibility of Mr. Robert Javery, Plant Engineer for Stevens Linen Associates, Inc. His address is: Stevens Linen Associates, Inc., Box 220, Webster, Massachusetts, 01570 (phone 617/943-0600).
- g. Purpose of Dam - New Pond Dam originally served as a water supply for the mills downstream. The outlet works have been sealed, and New Pond is presently used for recreational purposes only.
- h. Design and Construction History - No records of the construction of the dam are available. The type of construction utilized indicates that the dam was constructed prior to 1900. A 1925 inspection report indicates that water had not run over the spillway for some years. The gate to the outlet works was sealed in approximately the last five years.
- i. Normal Operational Procedures - The structures are maintained on a demand basis. There are no operational controls present at the dam.

### 1.3 Pertinent Data

Elevations given in this report are on National Geodetic Vertical Datum (NGVD) formerly referred to as Mean Sea Level (MSL).

- a. Drainage area - The 2.04 square mile watershed surrounding New Pond and Hayden Pond is sparsely developed and heavily wooded. The terrain is hilly with some upland marsh areas. The combined surface areas of New Pond and Hayden Pond occupy about 5.6% of the total drainage area.
- b. Discharge at Dam Site - There are no records of discharges at the dam site.
  - (1) Outlet works size-----2' x 2'-4" (sealed)
  - (2) Maximum known flood at damsite-----No records available
  - (3) Ungated spillway capacity at top of dam  
100 cfs @ 533 elev.
  - (4) Ungated spillway capacity at test flood elevation  
150 cfs @ 533.35 elev.
  - (5) Gated spillway capacity at normal pool elevation-----N/A
  - (6) Gated spillway capacity at test flood elevation-----N/A

(7) Total spillway capacity at test flood elevation  
150 cfs @ 533.35 elev.

(8) Total project discharge at test flood elevation  
580 cfs @ 533.35 elev.

c. Elevation (ft. above MSL)

(1) Streambed at centerline of dam-----513  
(2) Test flood tailwater-----516+ (Est.)  
(3) Upstream portal invert diversion tunnel-----None  
(4) Recreation pool-----531  
(5) Full flood control pool-----N/A  
(6) Spillway crest-----531  
(7) Design surcharge (Original Design)-----Unknown  
(8) Top dam-----533  
(9) Test flood design surcharge-----533.35

d. Reservoir

(1) Length of test flood pool-----3,950 ft. (Est.)  
(2) Length of recreation pool-----3,900 ft. (Est.)  
(3) Length of flood control pool-----N/A

e. Storage (acre-feet)

(1) Recreation pool-----300 Ac-ft  
(2) Flood control pool-----N/A  
(3) Spillway crest pool-----300 Ac-ft  
(4) Top of dam-----500 Ac-ft  
(5) Test flood pool-----525 Ac-ft

f. Reservoir Surface (acres)

(1) Recreation pool-----74.4  
(2) Flood-control pool-----N/A

- (3) Spillway crest-----74.4  
 (4) Test flood pool-----86.0  
 (5) Top of dam-----84.3

g. Embankments

Dam

Dike

- |                     |   |                             |
|---------------------|---|-----------------------------|
| (1) Type            | Earth embankment<br>w/partial stone<br>masonry D/S face | Earth<br>embankment         |
| (2) Length          | Approx. 450 ft.<br>incl. spillway                       | Approx. 420 ft.             |
| (3) Height          | Approx. 20 ft. max.                                     | Approx. 12 ft.<br>max.      |
| (4) Top width       | 12 to 25 ft.  | 11 to 15 ft.                |
| (5) Side slopes     | ranges 1.5 to 3:1 D/S<br>except at stone masonry        | ranges from<br>3 to 4:1 D/S |
| (6) Zoning          | Unknown   | Unknown                     |
| (7) Impervious Core | Unknown, 2" wood noted<br>in 1938 inspect. report       | Unknown                     |
| (8) Cutoff          | Unknown   | Unknown                     |
| (9) Grout Curtain   | Probably none   | Probably none               |

h. Diversion and Regulating Tunnel-----None

i. Spillway

- (1) Type-----masonry broad crested weir with  
1 ft. deep notch - 3.5 ft. wide
- (2) Length of weir-----29 ft.
- (3) Crest elevation-----531 for notch, 532 remainder
- (4) Gates-----None
- (5) U/S Channel-----None-edge of pond
- (6) D/S Channel-----25 ft.+ drop in 800 ft. then 1,200  
ft. of marsh to next pond

- i. Regulating Outlets. There is no presently operating regulating outlet or pond drain for this structure. The gate at the intake end has been sealed and the valve stem is no longer in place. The size of the gate is unknown but the outlet conduit dimensions are 2 feet horizontal by 2 feet 4 inches vertical. The invert elevation at the outlet end of the conduit is approximately elevation 513.

## SECTION 2: ENGINEERING DATA

2.1 Design Records - No design records were located for the New Pond Dam.

2.2 Construction Records - No records of the original construction were located.

2.3 Operation Records - No operational records were located for the dam.

### 2.4 Evaluation

a. Availability - No records for the dam other than prior inspection reports were located.

b. Validity - There are no known design, construction or operating records.

c. Adequacy - The absence of known records requires that the evaluation of the dam during this investigation be based on the visual examination described in the following section.

## SECTION 3: VISUAL INSPECTION

### 3.1 Findings

- a. General - The hydraulic-hydrologic reconnaissance of the facility with the Owner took place on 14 September 1978. The structural and soils portions of the Phase I visual examination of New Pond Dam were conducted on 20 September 1978.

In general, the dam was observed to be in fair condition. The area is overgrown with trees and there has been a long standing condition of seepage at the embankments.

Visual inspection checklists for the site visits are included in Appendix A and selected photographs are given in Appendix C.

- b. Dam - The embankments at this site were divided into two areas for the purpose of this report. The embankment south of the entrance road was considered the dam, while the embankment to the north was considered a dike. There was no visual evidence of major lateral movement or settlement at the dam or dike; however, there is local seepage and erosion, and a heavy growth of brush and trees. The open joint stone masonry walls at the dam and spillway appear to be stable and in good condition. The following specific items were noted during the site examination.
- (1) The dam and dike crests and slopes have a heavy cover of brush and trees that limits visual observation of their condition, as shown in Photos 1, 2, 11, 13, 15, & 19. There are also numerous tree cuttings and stumps at the base of the wall below the spillway.
  - (2) The upstream cobble slope protection at the dam and dike is partly concealed by brush and roots, and does not appear to provide complete coverage on the slopes, as shown in Photos 12, 16, & 18. The root mat is locally undercut along the upstream face.
  - (3) The downstream toe of the main dam has slight seepage with "rust" staining at the left end as shown in Photo 14 and near the center, and moderate seepage flow from under rocks at the embankment bend near the left quarter point. There are also pockets of water below the stone masonry downstream face and slight flow at the location of the abandoned gate. No evidence of soil movement was observed at the various seepage locations.
  - (4) The downstream toe of the dike does not show active seepage, but there is currently a pond below the right end, as shown

in Photo 17, and there has been ponded water to a depth of several feet in another low area near the center, as shown in Photo 20.

- (5) The crests of both the main dam and the dike are irregular in both width and elevation, with the freeboard varying from as low as 1.8 ft at two locations to over 2 ft at others.
  - (6) There is an apparent eroded hole about 2 ft deep in the dam crest alongside the left edge of the spillway; this hole has seeping water at the bottom.
  - (7) The right wingwall at the upstream gate opening has been undercut by erosion.
  - (8) A few pieces of stone masonry have fallen from the main downstream wall of the dam and from a small wall above the steep downstream slope at the location of the moderate seepage.
  - (9) There is an apparent eroded notch about 10 ft long and 1 ft deep in the downstream face of the dike where the crest is low, as indicated on the plan in Appendix C.
  - (10) Vehicle access for maintenance or repairs is difficult at the main dam and nearly impossible at the dike, primarily because of the numerous trees.
- c. Appurtenant Structures - The stone masonry wall at the downstream face of the dam, as shown in Photos 5 and 6, is in good condition with very few voids. The outlet structure inlet, as shown in Photos 3 and 4, is also of rubble stone masonry and in good condition. Several of the training wall top stones have been displaced. The valve stem for the conduit inlet is lying on the upstream face of the dam to the right of the intake and the gate is reported to have been sealed. Seepage from the outlet conduit (or from beneath the dam) was observed at the downstream end of the conduit. Debris is present in the downstream channel, as shown in Photo 7.

The spillway, as shown in Photos 8, 9 and 10, is in good condition. The spillway foundation is rubble stone masonry which has been overlain with concrete paving. Minor cracking is present in the paving. A notch (or pilot channel) has been cut in the basic spillway and surfaced with concrete. The stones removed during the resurfacing of the spillway have been dumped at the downstream toe. The entrance of the notch or pilot channel has stop log guides present which are rusted. No stop logs were observed at the dam.

- d. Reservoir Area - The reservoir is divided by a causeway into two ponds, New Pond and Hayden Pond. While no outlet for Hayden Pond or connecting culvert to New Pond was located, the ponds apparently have the same water surface elevation. Either a submerged culvert is present or the causeway embankment is very porous. The causeway would therefore act as a flood retarding structure in the event of a dam failure. The area around the ponds is generally wooded and, particularly Hayden Pond, is extensively developed. The present shoreline development includes more than 40 structures.

The side slopes of the ponds are variable and generally wooded. There is no significant potential for landslides into the ponds which would create waves that might overtop the dam. No conditions were noted which would result in a sudden increase in sediment load into the ponds.

- e. Downstream Channel - Immediately downstream of the spillway, the channel contains discarded stones from former spillway modifications. The area adjacent to the outlet works contains brush and branch debris from probable former clearing operations. The channel drops approximately 25 feet in 800 feet through a wooded area. This section from the spillway follows a somewhat defined channel while there is little evidence of a channel coming from the outlet works. The next 1,200 feet in the watercourse is through a marsh area which empties into a small pond known locally as Mosquito Pond. The flow then passes through two 60 foot long 42 inch A.C.C.M. pipes under Oxford Road into Wallis Pond. Flow from Wallis Pond passes under Charleton Road via two 45 foot long 54 inch A.C.C.M. pipes into Larner Pond. The area from New Pond to Oxford Road is undeveloped and few houses are present along Wallis and Larner Ponds.

- 3.2 Evaluation - The New Pond Dam embankments and appurtenances appear to be performing satisfactorily at the present time; previous inspection reports indicate that seepage at the embankments is a long-standing condition. However, the continuing seepage, the low points along the crest, and the numerous large trees could provide significant potential for embankment failure under conditions of higher than normal water levels or heavy winds.



## SECTION 4: OPERATIONAL PROCEDURES

- 4.1 Procedures - In general, there is no established routine for the operation of the dam.
- 4.2 Maintenance of Dam - The dam and spillway have received minimal maintenance and then only upon demand. There is no established formal procedure for the maintenance of the dam. The present dam and dike have become overgrown with tree and brush growth.
- 4.3 Maintenance of Operating Facilities - The only operating facility, the reservoir drain, has been sealed.
- 4.4 Description of any Warning System in Effect - There is no established warning system or emergency preparedness plan in effect for this structure.
- 4.5 Evaluation - There is currently no operational procedures in effect for this dam. Formal operational procedures, maintenance programs, warning systems and emergency preparedness plans should be established. Periodic observation should be made and the tree and brush growth at the dam and dike should be brought under control. Maintenance of the dam should be performed at regular intervals.

## SECTION 5: HYDRAULIC/HYDROLOGIC

### 5.1 Evaluation of Features

- a. General - New Pond Dam is an earth embankment located in the town of Dudley. The dam consists of a main embankment and a dike, each having a length of approximately 400 feet with a concrete spillway located at the westerly end of the main embankment. The dam was formerly used to regulate flow for water power for downstream mills. It is no longer used for this purpose but rather to control levels for recreational use of New Pond and Hayden Pond. The pond has a water surface area of approximately 74 acres at a spillway crest elevation of 531, and an estimated total storage capacity of 300 acre feet. The spillway consists of a concrete flume in which a notch has been cut for controlling and lowering the water levels in New Pond. The spillway discharges to the downstream face of the dam where flow is received by a small brook which makes its way in a southeasterly direction for approximately 2,000 feet to Mosquito Pond. From here, flow passes beneath Oxford Road into Wallis Pond then into Larner Pond and, subsequently, to Merino Pond before eventually joining the French River in Webster. All of the information utilized in this report was obtained from visual examination as well as measurements made at the site during the inspection and supplemented by information contained on the U.S.G.S. quadrangle sheets. Data pertaining to the area-elevation-storage capacity of the pond was developed from the U.S.G.S. quad sheets.
- b. Design Data - No hydraulic/hydrologic design data are available for the dam site.
- c. Experience Data - No records of past floods are available for the dam site.
- d. Visual Observations - Inspection of the dam was made on 14 September 1978. At that time the water level was only one-quarter inch below the crest of the spillway. The spillway was noted to be a concrete flume having a width of 29 feet and a length of 22 feet with a drop of one foot in a 20-foot length. The sidewalls to the flume or spillway varied in height from 18 to 30 inches. In the center of the flume is a notch approximately 43 inches wide and about 12 inches deep which apparently had been cut out of the original flume or spillway within the last decade so as to provide releases from the pond at a stage 11 to 12 inches lower than the previous spillway elevation. The spillway was noted to be in good hydraulic condition and the discharge was to a pile of dumped rock some ten feet below the downstream side of the flume where the outlet stream commences. The outlet

stream was noted to drop rather rapidly, falling approximately 25 feet in the first 800 feet to a swampy area, thence flowing through the swampy area a distance of nearly 1,200 feet before entering Mosquito Pond.

- e. Test Flood Analysis - Based upon Corps of Engineers guidelines, the recommended test flood for the size (small) and hazard (low) is within the range of 50-year to 100-year flood. The drainage area tributary to the Hayden Pond-New Pond complex is approximately 2.04 square miles. This area is sparsely populated, is hilly with some upland marshy areas, and the combined water surface areas of New Pond and Hayden Pond occupy about five and one half percent of this drainage area. The water shed terrain was determined to be rolling, and an inflow rate of 2,250 cfs per square mile was utilized with the 2.04-square mile drainage area to produce a test flood inflow of approximately 2,300 cfs for one half PMF. The 100-year flood was found to have an inflow rate of 925 cfs. Storage routing of this flow indicated that this peak rate would be reduced to approximately 580 cfs by the storage and spillway characteristics of New Pond. However, routing of this flow indicated that, even with the reduced flow of 580 cfs, the test flood would still overtop the dam by 0.35 feet, resulting in an average flow depth of 4 inches over the embankment.

Hayden Pond shoreline has a low point at its north end leading to Pierpoint Meadow Pond. No culvert or outlet from the pond was located at this point nor did a resident ever hear of overland flow from the pond. However, the resident did report sandbagging had been employed at this location at high pond levels and the residents have been troubled with seepage from the pond along this route.

- f. Dam Failure Analysis - Based on Corps of Engineers Guidelines for Estimating Dam Failure hydrographs, and assuming that a failure would occur along a section 67 feet in length in the vicinity of the high point of the dam with the water level 2 ft above the spillway crest (elevation 533), the failure would result in a peak outflow of 10,000 cfs. This flow, however, would undergo a drastic reduction to 3,700 cfs in the first reach between the dam and Mosquito Pond, due to the vast storage area available. The water level in Mosquito Pond would rise to elevation 512, or approximately 2 feet over Oxford Road, as the flow would make its way into Wallis Pond. This level would likely cause minor water damage to one house in the immediate area. The flow from Wallis Pond into Larner Pond would be through the existing twin 54-inch diameter corrugated metal pipes beneath Charleton Road. The reduced failure outflow would overtop Charleton Road by approximately 0.8 foot with no apparent hazard. The considerably greater storage in Larner Pond, just downstream, would be sufficient to completely dampen out the remaining dam failure

flow with no damage to be expected in Marino Pond and other points downstream. It is, therefore, recommended that the high hazard classification for this dam be reduced to "low."

## SECTION 6: STRUCTURAL STABILITY

### 6.1 Evaluation of Structural Stability

- a. Visual Observation - There was no visible evidence of dam, dike, or spillway instability during the site examination on 20 September 1978. Seepage at the various locations along the downstream toe of the dam embankment showed no evidence of active erosion or piping, and is not considered to pose an immediate hazard to the stability of the downstream slope.
- b. Design and Construction Data - Except for old inspection report references to a 2-in. wood corewall and gravel embankment material, there is substantially no design or construction information on the dam and dike embankments. Local surface exposures do appear to confirm a gravelly sand embankment material, but the extent of such material is not certain. Thus, theoretical analyses of the structural stability of the embankments are not possible.

The above-water embankment geometry, as determined by limited measurements at the site, and the long period of service of the dam indicate that the embankments would be expected to be adequately stable under static loading conditions. Whether or not the seepage can cause future instability has not been determined.

- c. Operating Records - No operating records are known to exist for the dam, except for Inspection Reports by Worcester County.
- d. Post-Construction Changes - Without design or "as-built" drawings, it is not known if there have been post-construction changes to the embankments. A 1930 inspection report does make reference to "reconstructed and widened embankments." Based on comments in previous inspection reports and the appearance of the spillway, it appears that the spillway was paved with concrete after its original construction and subsequently the pond was lowered approximately one foot by the cutting of a notch in the broad-crested spillway.
- e. Seismic Stability - The dam is located in a Seismic Zone No. 2 and, in accordance with recommended Phase I guidelines, does not warrant seismic analysis.

## SECTION 7: ASSESSMENT, RECOMMENDATIONS AND REMEDIAL MEASURES

### 7.1 Dam Assessment

- a. Condition - The visual examination of New Pond Dam, including the dike, did not reveal any evidence of failure or conditions which would warrant urgent remedial treatment. However, because of the need for maintenance and additional investigation that is outlined hereinafter, the project is considered to be in only fair condition.
- b. Adequacy of Information - All of the information for the Phase I Investigation had to be obtained from visual examination and limited measurements at the site. This information has been sufficient for the purpose of this investigation, but it does not permit detailed evaluation of stability, seepage or available freeboard.
- c. Urgency - The recommended additional investigations and remedial measures outlined in Sections 7.2 and 7.3, respectively, should be undertaken within one year after receipt of this report by the Owner.
- d. Need for Additional Investigations - Additional investigations should be performed by the Owner as outlined in the following section.

### 7.2 Recommendations

It is recommended that the following additional investigations be performed by the Owner:

1. An investigation to determine whether or not the seepage that is occurring at the downstream toe of the dam can have a significant effect on long-term dam stability. This would include regular monitoring of the various observed seepage locations, including checks during higher than normal pond levels, to determine if conditions are changing with time.
2. Topographic survey of the dam and dike embankments, including underwater portions, and evaluation of actual embankment configuration with respect to stability and available freeboard. If the survey does not provide sufficient information to confirm adequate stability, it might be necessary to carry out test borings and/or test excavations to determine the character of the embankment material and the existence and condition of core walls.

3. A detailed hydrologic-hydraulic investigation to determine the necessary discharge capabilities of the spillway and the measures required to significantly increase the spillway capacity to meet this requirement.
4. An investigation to determine the required measures to make the outlet works (reservoir drain) operational.

### 7.3 Remedial Measures

- a. Operation and Maintenance Procedures - It is recommended that the following remedial work be undertaken by the Owner, in addition to the investigations outlined in Section 7.2, to correct deficiencies noted during the visual examination:
  - (1) Clear brush and trees from the dam and dike embankments, including stump removal and backfilling, establish vegetation cover, and cut grass and weeds on the embankments at least once a year.
  - (2) Provide additional riprap or cobble slope protection where it is lacking or deficient on the upstream faces of the dam and dike; restore and reshape local eroded areas.
  - (3) Reshape the dam and dike crests to provide uniform freeboard and permit vehicle access for maintenance and repair. Repair eroded notch in dike downstream slope and hole in dam crest near spillway. The extent of the reshaping will be subject to the results of the evaluation of actual embankment configuration recommended in Section 7.2.
  - (4) Replace fallen stones in stone masonry walls.
  - (5) Remove debris from downstream side of spillway and outlet structures.

Due to the discharge capabilities of the spillway and the condition of the dam, it is recommended that during high reservoir levels and unusually heavy precipitation the Owner provide surveillance of the embankments and spillway. The Owner should also develop a formal emergency procedures plan and warning system in cooperation with local officials in downstream communities. Finally it is recommended that the owner establish a formal operational procedure and maintenance program and a program of annual technical inspections.

### 7.4 Alternatives - Not applicable.

APPENDIX A - INSPECTION TEAM

ORGANIZATION AND CHECKLIST

Page No.

VISUAL INSPECTION PARTY ORGANIZATION

A-1

VISUAL INSPECTION CHECKLIST

Dam Embankment, Stone  
Dam Embankment, Earth (E-W)  
Dike Embankment (N-S)  
Spillway  
Outlet Works  
Hydrologic-Hydraulic Considerations  
Downstream Culverts

A-2  
A-3  
A-4  
A-5  
A-6  
A-7  
A-8



VISUAL INSPECTION PARTY ORGANIZATION  
NATIONAL DAM INSPECTION PROGRAM

DAM: New Pond

DATE: September 14, 1978 (Soils and structures on 20 September 1978)

TIME: 2:15 p.m.

WEATHER: Clear to partly cloudy - 65°F, lt. var. wind

WATER SURFACE ELEVATION UPSTREAM: ½" below spillway crest

STREAM FLOW: Only ds flow leakage through abandoned gate and  
seepage flow less than 1 cfs

INSPECTION PARTY:

1. Joseph E. Downing - CDM
2. Charles E. Fuller - CDM
3. \_\_\_\_\_
4. Roger H. Wood - CDM - 9/20/78
5. Peter LeCount - H&A - 9/20/78
6. \_\_\_\_\_

PRESENT DURING INSPECTION:

1. Robert Javery - Stevens Linen Associates
2. \_\_\_\_\_
3. \_\_\_\_\_
4. \_\_\_\_\_

VISUAL INSPECTION CHECK LIST  
NATIONAL DAM INSPECTION PROGRAM

DAM: New Pond

DATE: 9/20/78

EMBANKMENT: Dam, Stone

CHECK LIST	CONDITION
1. Upstream Slope a. Vegetation b. Sloughing or Erosion c. Rock Slope Protection - Riprap Failures d. Animal Burrows	1. a. Thick brush, weeds, trees to 5 in. dia. b. Root mat locally undercut few inches c. Cobbles among roots & brush d. None observed
2. Crest a. Vegetation b. Sloughing or Erosion c. Surface cracks d. Movement or Settlement	2. a. Grass, weeds, overhanging brush & trees. b. Hole alongside spillway (2.5' x 4.5' x 2' deep-slight seepage on bottom) c. None observed d. Crest elevation varies approx. 6 in. cause not known.
3. Downstream Slope a. Vegetation b. Sloughing or Erosion c. Surface cracks d. Animal Burrows e. Movement or Cracking near toe f. Unusual Embankment or Downstream Seepage g. Piping or Boils h. Foundation Drainage Features i. Toe Drains	3. a. Brush above wall, trees & brush at base. b. N/A (stone masonry wall) c. N/A (stone masonry wall) d. N/A (stone masonry wall) e. N/A (stone masonry wall) f. Local small pockets of water at base of wall, slight flow at drain from gate, slight seepage (w/rust stain) at toe of slope below left abutment. g. None observed h. None known i. None known
4. General a. Lateral Movement b. Vertical Alignment c. Horizontal Alignment d. Condition at Abutments and at Structures e. Indications of Movement of Structural Items f. Trespassing g. Instrumentation Systems	4. a. Not evident b. Crest elev. varies approx. 6 in. c. Wall face looks good d. Hole alongside spillway, gate wingwall undercut e. None observed (except few stones from wall) f. Appears minor g. None

VISUAL INSPECTION CHECK LIST  
NATIONAL DAM INSPECTION PROGRAM

DAM: New Pond

DATE: 9/20/78

EMBANKMENT: Dam, Earth (E-W)

CHECK LIST	CONDITION
1. Upstream Slope a. Vegetation b. Sloughing or Erosion c. Rock Slope Protection - Riprap Failures d. Animal Burrows	1. a. Brush, weeds, trees to 24 in. dia. b. Root mat locally undercut few inches c. Gravel & cobbles, local gaps d. None observed
2. Crest a. Vegetation b. Sloughing or Erosion c. Surface cracks d. Movement or Settlement	2. a. Grass, weeds, brush & trees b. None observed c. None observed d. Crest elevation varies approx. 6 in. cause not known.
3. Downstream Slope a. Vegetation b. Sloughing or Erosion c. Surface cracks d. Animal Burrows e. Movement or Cracking near toe f. Unusual Embankment or Downstream Seepage g. Piping or Boils h. Foundation Drainage Features i. Toe Drains	3. a. Grass, weeds, brush, trees to 24 in. dia. b. Slope irregular in few locations possibly from fallen trees; stone wall at steep location partly fallen down. c. None observed d. None observed e. None observed f. Local slight seepage with rust stain where ground is low at toe; moderate seepage flow from under rocks at one location. g. None observed h. None known i. None known
4. General a. Lateral Movement b. Vertical Alignment c. Horizontal Alignment d. Condition at Abutments and at Structures e. Indications of Movement of Structural Items f. Trespassing g. Instrumentation Systems	4. a., b., c. Dam shape somewhat irregular, movement not evident. d. N/A e. N/A f. Appears minor g. None

VISUAL INSPECTION CHECK LIST  
NATIONAL DAM INSPECTION PROGRAM

DAM: New Pond

DATE: 9/20/78

EMBANKMENT: Dike (N-S)

CHECK LIST	CONDITION
1. Upstream Slope a. Vegetation b. Sloughing or Erosion c. Rock Slope Protection - Riprap Failures d. Animal Burrows  2. Crest a. Vegetation b. Sloughing or Erosion c. Surface cracks d. Movement or Settlement  3. Downstream Slope a. Vegetation b. Sloughing or Erosion c. Surface cracks d. Animal Burrows e. Movement or Cracking near toe f. Unusual Embankment or Downstream Seepage g. Piping or Boils h. Foundation Drainage Features i. Toe Drains  4. General a. Lateral Movement b. Vertical Alignment c. Horizontal Alignment d. Condition at Abutments and at Structures e. Indications of Movement of Structural Items f. Trespassing g. Instrumentation Systems	1. a. Brush, weeds, trees to 24 in. dia. b. Appears minor c. Gravel & cobbles, generally intact d. None observed  2. a. Grass, weeds, brush & trees b. Shape varies, possibly due to past erosion by water or foot traffic. c. None evident d. Crest elevation varies approx. 1 ft. cause not known.  3. a. Grass, weeds, brush, trees to 24 in. dia. b. Local eroded area, approx. 2' x 10' x 1' deep, appears to have been caused by overtopping. c. None observed d. None observed e. None observed f. No obvious active seepage but ponded water along approx. 1/2 of toe length g. None observed h. None known i. None known  4. a., b., c. Dam shape irregular, movement not evident. d. Gradual transition to natural ground at north abutment. e. N/A f. Appears minor g. None

VISUAL INSPECTION CHECK LIST  
NATIONAL DAM INSPECTION PROGRAM

DAM: New Pond

DATE: Sept. 20, 1978

SPILLWAY: \_\_\_\_\_

CHECK LIST	CONDITION
1. Approach Channel a. General Condition b. Obstructions c. Log Boom etc.	1. a. Good condition, spillway adjacent to pond. b. Brush at right & left edge. c. None
2. Weir a. Flashboards b. Weir Elev. Control (Gate) c. Vegetation d. Seepage or Efflorescence e. Rust or Stains f. Cracks g. Condition of Joints h. Spalls, Voids or Erosion i. Visible Reinforcement j. General Struct. Condition	2. a. Steel guides for stop logs present in pilot channel. Some rust-good condition. b. No gate c. None observed in spillway d. None observed e. None observed f. Shrinkage and cold joint cracks g. Good condition h. Minor spalls and chips i. None observed j. Good condition
3. Discharge Channel a. Apron b. Stilling Basin c. Channel Floor d. Vegetation e. Seepage f. Obstructions g. General Struct. Condition	3. a. None present b. Vertical drop to channel below. Some loose rock & concrete from spillway modification present below. c., d. Heavily forested. Piled branches etc. e. Area moist-some trapped water present f. See 3 b, c & d g. Fair condition
4. Walls a. Wall Location <u>At end of weir</u> (1) Vegetation (2) Seepage or Efflorescence (3) Rust or Stains (4) Cracks (5) Condition of Joints (6) Spalls, Voids or Erosion (7) Visible Reinforcement (8) General Struct. Condition	4. a. Wall is open joint stone masonry wall at end of weir and also serves as downstream wall of dam. (1) Moss growth (2) N/A (3) None observed (4) N/A (5) Open-good condition (6) None observed (7) N/A (8) Good condition

VISUAL INSPECTION CHECK LIST  
NATIONAL DAM INSPECTION PROGRAM

DAM: New Pond

DATE: Sept. 20, 1978

OUTLET WORKS: \_\_\_\_\_

CHECK LIST	CONDITION
1. Inlet a. Obstructions b. Channel c. Structure d. Screens e. Stop Logs f. Gates 2. Control Facility a. Structure b. Screens c. Stop Logs d. Gates e. Conduit f. Seepage or Leaks 3. Outlet a. Structure b. Erosion or Cavitation c. Obstructions d. Seepage or Leaks 4. Mechanical and Electrical a. Crane Hoist b. Hydraulic System c. Service Power d. Emergency Power e. Lighting f. Lightning Protection	1. a. None at surface b. 12' long, 3'-6" wide at inlet c. Open joint stone masonry walls. Inlet walls flared. Top slightly displaced. d. None e. None f. Gate abandoned and plugged. Anchor bolt for missing shaft still projecting from stone. 2. a., b., c., d. None e. Beneath dam - not visible f. See 3 3. a. Open joint stone masonry well chinked wall. Wall is downstream face of dam. Good condition. b. None observed c. Downstream overgrown - heavily forested. Piled branches and tree cuttings. d. Flow is coming out 2' Horiz. & 2'-4" Vert. outlet of conduit and beneath adjacent stones of downstream wall of dam. 4. None

VISUAL INSPECTION CHECK LIST  
NATIONAL DAM INSPECTION PROGRAM

DAM: NEW POND

DATE: September 14, 1978

HYDROLOGIC-HYDRAULIC CONSIDERATIONS: \_\_\_\_\_

CHECK LIST	CONDITION
1. Upstream Watershed a. Type of Terrain b. Hydrologic Controls	1a. Slight to moderately hilly (5-10% av. slope) 1b. Hydrologic controls include Easterbrook Pond and swampy area (20 acres) just d.s. in southwesterly corner of watershed as well as swampy area (10 acres) west of Corbin Rd. Further control from northerly portion of watershed by Hayden Pond which appears to be hydraulically connected, although no culvert opening could be found.
2. Reservoir a. Type of Terrain b. Development	2a. Slight to moderately hilly with shallow pond. 2b. Development is presently sparse (12 houses around shoreline) although more residential development now evident in area adjacent to shoreline (n.e. of pond)
3. Spillway a. Adjacent Low Points b. Spillway Approach (Slope) c. Spillway Discharge (Slope) d. Spillway Type	3a. Low point on dam is on easterly leg (sta. 2+00) where wash area (2' wide) indicates previous spillage (see sketch) 3b. Approach is edge of pond which is 2-3 ft. deep at stream bank. 3c. Discharge is from concrete flume vertically downward about 9-10-ft on to damped rock and debris. 3d. Concrete flume 29' wide x 22' long (see sketch) with 12" x 42" notch cut out for low flow discharge.
4. Downstream Watershed a. Reach No. (1) Control (Bridge, dam, culvert, etc.) (2) Channel Characteristics (3) Development (4) Visible Utilities (5) Special Problems (Hospital, etc.)	4a. Reach No. 1 - 2000-ft from New Pond to westerly portion of Mosquito Pond (28' drop) with flow thru 1500-ft of swamp before easterly Wallis Pond. Flow from Mosquito Pond to Wallis Pond controlled by twin 42" ACCM as is flow from Wallis Pond to Larner Pond by twin 54" ACCM. Combined storage of Mosquito, Wallis and Larner Pond is probably sufficient to store waters released from New Pond by failure of dam.

CAMP DRESSER & MCKEE  
Environmental Engineers  
Boston, Mass.

CLIENT \_\_\_\_\_  
PROJECT \_\_\_\_\_  
DETAIL \_\_\_\_\_

JOB NO. \_\_\_\_\_  
DATE CHECKED \_\_\_\_\_  
CHECKED BY \_\_\_\_\_

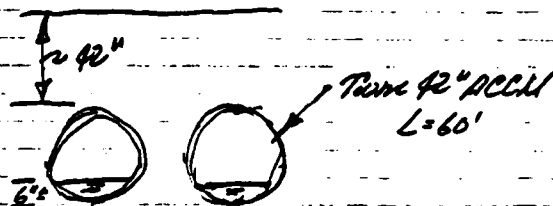
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DATE Sept. 16/78  
COMPUTED BY Miller

### DOWNSTREAM CULVERTS

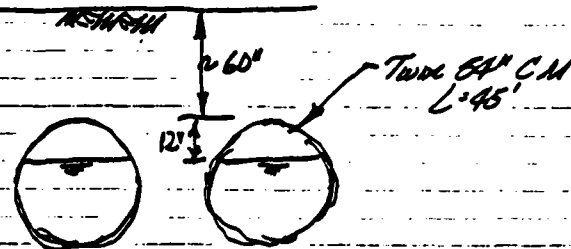
#### Hayden Pond to New Pond

No visible culvert but slope header suggests one. W.S. 3' below hwy pt. on road.

#### Mosquito Pond to Wallis Pond



#### Wallis Pond to Lerner Pond





APPENDIX B

LIST OF AVAILABLE DOCUMENTS AND  
PRIOR INSPECTION REPORTS

Page No.

LIST OF AVAILABLE DOCUMENTS

None Available

PRIOR INSPECTION REPORTS

<u>DATE</u>	<u>BY</u>	
1. January 7, 1925	Worcester County Engineer	B-1
2. February 9, 1927	Worcester County Engineer	B-2
3. April 2, 1930	Worcester County Engineer	B-3
4. July 27, 1932	Worcester County Engineer	B-4
5. January 13, 1936	Worcester County Engineer	B-5
6. January 13, 1937	Worcester County Engineer	B-6
7. October 18, 1938	Worcester County Engineer	B-7 & 8
8. March 23, 1939	Worcester County Engineer	B-9
9. April 17, 1939	Worcester County Engineer	B-10
10. December 11, 1940	Worcester County Engineer	B-11
11. December 30, 1941	Worcester County Engineer	B-12
12. December 10, 1942	Worcester County Engineer	B-13
13. February 18, 1944	Worcester County Engineer	B-14
14. December 10, 1945	Worcester County Engineer	B-15
15. December 1, 1947	Worcester County Engineer	B-16
16. December 2, 1950	Worcester County Engineer	B-17
17. November 29, 1951	Worcester County Engineer	B-18
18. September 13, 1955	Worcester County Engineer	B-19
19. October 25, 1963	Worcester County Engineer	B-20 & 21
20. May 15, 1964	Worcester County Engineer	B-22
21. August 29, 1968	Worcester County Engineer	B-23 & 24
22. March 14, 1969	Worcester County Engineer	B-25
23. February 9, 1972	Unknown	B-26

COUNTY OF WORCESTER MASSACHUSETTS  
COUNTY ENGINEER

Inspection of Dams, Reservoir Dams, and Reservoirs.

Inspected by L. O. Marden Date Jan. 7, 1925 Dam No. 14-10

Town Dudley - Hayden Res. Location 1 1/2 mi. S. Charlton T. Line  
Owner Stevens Linc. Works Use Storage  
Material and Type <sup>400'</sup> Earth emb. - 220' main turn cut stone dry laid wall 8' thick  
1 1/2:1 rip rap upstream face

Dam Designed by \_\_\_\_\_ Constructed by \_\_\_\_\_ Year \_\_\_\_\_

SPILLWAY LENGTH 33 1/2' - spillway 25' east end dam  
El. top Abutment 100 El. Crest 87 El. Apron \_\_\_\_\_ El. Streambed 8'  
Width top Abutment 20-22 Width top Crest 40 Width bottom Spillway 50+-  
Width Flashboards carried 3' Kind Flashboards \_\_\_\_\_  
El. Flowline Cleanout Pipe \_\_\_\_\_ Size and Kind Cleanout Pipe \_\_\_\_\_  
Kind of Foundation under Spillway Gravel soil  
Condition Water has not run over top of spillway for some years, grassed over. Filled in top of wall with mortar

EMBANKMENT LENGTH 400'  
El. Top 100 El. Natural Ground 81 Width Top 20-22  
Width of Bottom 50+- Upstream Slope 1 1/2:1 riprap Downstream Slope 1 1/2:1  
Kind of Corewall \_\_\_\_\_ Riprap 1 1/2:1 4.5  
Material in Embankment Gravel soil Foundation gravel soil  
Condition Good except cut off trees and brush

2x2 waste, main channel  
GATES 3x2 waste, appears to be stoned up Location just e. ast spillway  
Size \_\_\_\_\_ Kind \_\_\_\_\_ El. Flowline \_\_\_\_\_  
Condition \_\_\_\_\_

WHEEL \_\_\_\_\_ Kind \_\_\_\_\_ Size \_\_\_\_\_ Rated H. P. \_\_\_\_\_  
Location \_\_\_\_\_ Ave. Head \_\_\_\_\_  
Evidence of Leaks in Structure none

Recent Repairs and Date none  
Topography of Country below Dam Wooded valley -- small slope

Nature of Buildings and Roads below Dam none

Number Acres in Pond \_\_\_\_\_ Drainage Area in Square Miles \_\_\_\_\_  
Discharge in Second Feet per Square Mile \_\_\_\_\_  
Estimated Storage Million Cubic Feet \_\_\_\_\_

APPENDIX B-1

Decree No. ....

Dam No. 14-10

COUNTY OF WORCESTER, MASSACHUSETTS  
OFFICE OF COUNTY ENGINEER

SECOND REPORT

Neg. Nos. ....

## INSPECTION OF DAMS, RESERVOIR DAMS AND RESERVOIRS

Town Dudley Date Feb. 9, 1927 Dam No. 14-10

Location Name of Pond or Stream Hayden Res.

Inspected by L.O. Marden

Owner Stevens Elinen Works. Use

MATERIAL &amp; TYPE See first Inspection Sheet

Elevations in feet: above (+) or below (-) full pond or reservoir level.

FOR DAM Bed of stream below top of spillway

FOR RESERVOIR

top of dam top of flashboards ground surface below

level of overflow pipe length in feet

width top in feet width bottom in feet size pipe to mill

inches length spillway in feet head in feet

Size of wheel H. P. developed

Size of gates location of gates

Foundation and details of construction

condition of embankment Cut off trees

Constructed by date and brush

Designed by location

Recent repairs and date

Evidence of leakage

Condition Fill in holes in embankment and top of downstream wall.

Topography of country below

Nature of buildings and roads below dam

No. Acres in watershed No. Acres in pond

Plans secured Percent watershed in cultivation

Percent in forests Note: Cross out word not applicable

# COUNTY OF WORCESTER MASSACHUSETTS

## COUNTY ENGINEER

Inspection of Dams, Reservoir Dams, and Reservoirs.

Inspected by L. O. Marden-H. W. Crawford Date April 2, 1930. Dam No. 14-10

Town Dudley Location Hayden Reservoir.  
Owner Stevens Line Works Use storage.  
Material and Type

Dam Designed by Constructed by Year

SPILLWAY—Length Feet. Depth Feet

El. top Abutment. El. Crest. El. Apron. El. Streambed.

Width top Abutment. Width top Crest. Width bottom Spillway.

Width Flashboards carried. Kind Flashboards.

El. Flowline Cleanout Pipe. Size and Kind Cleanout Pipe.

Kind of Foundation under Spillway.

Condition should clean out brush etc and lower level to spillway  
provide concrete side walls.

EMBANKMENT—Length overall Feet

El. Top. El. Natural Ground. Width Top.

Width of Bottom. Upstream Slope. Downstream Slope.

Kind of Corewall. Riprap.

Material in Embankment. Foundation.

Condition Have reconstructed and widened embankments-OK.

GATES Location.

Size Kind El. Flowline.

Condition OK

WHEEL Kind Size Rated H. P.

Location Ave. Head.

Evidence of Leaks in Structure small leaks- seepage

Recent Repairs and Date see under embankment.

Topography of Country below Dam.

Nature of Buildings and Roads below Dam.

Number of Acres in Pond. Drainage Area in Square Miles.

Discharge in Second Feet per Square Mile.

Estimated Storage Million Cubic Feet.

# COUNTY OF WORCESTER MASSACHUSETTS

## COUNTY ENGINEER

Inspection of Dams, Reservoir Dams, and Reservoirs.  
Messrs. Crawford, Healy and

Inspected by L. O. Marden Date July 27, 1932 Dam No. 14-10

Town Dudley Location

Owner Stevens Linen Co. Use

Material and Type

Dam Designed by  Constructed by  Year

SPILLWAY—Length  Feet. Depth  Feet

El. top Abutment  El. Crest  El. Apron  El. Streambed

Width top Abutment  Width top Crest  Width bottom Spillway

Width Flashboards carried  Kind Flashboards

El. Flowline Cleanout Pipe  Size and Kind Cleanout Pipe

Kind of Foundation under Spillway

Condition

EMBANKMENT—Length overall  Feet

El. Top  El. Natural Ground  Width Top

Width of Bottom  Upstream Slope  Downstream Slope

Kind of Corewall  Riprap

Material in Embankment  Foundation

Condition

GATES  Location

Size  Kind  El. Flowline

Condition Discussed means of improving gates.

WHEEL  Kind  Size  Rated H. P.

Location  Ave. Head

Evidence of Leaks in Structure

Recent Repairs and Date

Topography of Country below Dam

Nature of Buildings and Roads below Dam

Number of Acres in Pond  Drainage Area in Square Miles

Discharge in Second Feet per Square Mile

Estimated Storage Million Cubic Feet

**COUNTY OF WORCESTER MASSACHUSETTS  
COUNTY ENGINEER**

Inspection of Dams, Reservoir Dams, and Reservoirs.

Inspected by L.O.M. Master Mccg. Healey Date Jan. 13, 36 Dam No. 14-10

Town Dudley Location Hayden Reservoir.

Owner Stevens Linen Works. Use \_\_\_\_\_

Material and Type \_\_\_\_\_

Dam Designed by \_\_\_\_\_ Constructed by \_\_\_\_\_ Year \_\_\_\_\_

**SPILLWAY**

El. top Abutment \_\_\_\_\_ El. Crest \_\_\_\_\_ El. Apron \_\_\_\_\_ El. Streambed \_\_\_\_\_

Width top Abutment \_\_\_\_\_ Width top Crest \_\_\_\_\_ Width bottom Spillway \_\_\_\_\_

Width Flashboards carried \_\_\_\_\_ Kind Flashboards \_\_\_\_\_

El. Flowline Cleanout Pipe \_\_\_\_\_ Size and Kind Cleanout Pipe \_\_\_\_\_

Kind of Foundation under Spillway \_\_\_\_\_

Condition abutment walls should be raised 2 feet-lower freeboard- new  
concrete crest

**EMBANKMENT**

El. Top \_\_\_\_\_ El. Natural Ground \_\_\_\_\_ Width Top \_\_\_\_\_

Width of Bottom \_\_\_\_\_ Upstream Slope \_\_\_\_\_ Downstream Slope \_\_\_\_\_

Kind of Cortwall \_\_\_\_\_ Riprap \_\_\_\_\_

Material in Embankment \_\_\_\_\_ Foundation \_\_\_\_\_

Condition believes large trees in embankment same cause of leaks if  
removed stumps should be entirely cut out.

**GATES** \_\_\_\_\_ Location \_\_\_\_\_

Size \_\_\_\_\_ Kind \_\_\_\_\_ El. Flowline \_\_\_\_\_

Condition large stream water coming thru gate with same closed leak about  
20-35 feet from gate house water side of dam- also several bad leaks  
along foot of embankment.

**WHEEL** \_\_\_\_\_ Kind \_\_\_\_\_ Size \_\_\_\_\_ Rated H. P. \_\_\_\_\_

Location \_\_\_\_\_ Ave. Head \_\_\_\_\_

Evidence of Leaks in Structure \_\_\_\_\_

Recent Repairs and Date \_\_\_\_\_

Topography of Country below Dam \_\_\_\_\_

Nature of Buildings and Roads below Dam \_\_\_\_\_

Number Acres in Pond \_\_\_\_\_ Drainage Area in Square Miles \_\_\_\_\_

Discharge in Second Feet per Square Mile \_\_\_\_\_

Estimated Storage Million Cubic Feet \_\_\_\_\_

APPENDIX B-5

# COUNTY OF WORCESTER MASSACHUSETTS

## COUNTY ENGINEER

Inspection of Dams, Reservoir Dams, and Reservoirs.

Inspected by L. O. H. Mast, Mech. Healey Date 1-12-37 Dam No. 14-10

Town Dudley Location Hayden Reservoir

Owner Stevens Linen Works Use

Material and Type

Dam Designed by  Constructed by  Year

SPILLWAY—Length  Feet. Depth  Feet

El. top Abutment  El. Crest  El. Apron  El. Streambed

Width top Abutment  Width top Crest  Width bottom Spillway

Width Flashboards carried  Kind Flashboards

El. Flowline Cleanout Pipe  Size and Kind Cleanout Pipe

Kind of Foundation under Spillway

Condition Abutment walls should be raised 2 ft. Low free board new concrete crest.

EMBANKMENT—Length overall  Feet

El. Top  El. Natural Ground  Width Top

Width of Bottom  Upstream Slope  Downstream Slope

Kind of Corewall  Riprap

Material in Embankment  Foundation

Condition Believe large trees in embankment cause some of leak. If removed stumps should be entirely cut out.

GATES  Location

Size  Kind  El. Flowline

Condition Large stream water coming thru gate with same closed. Leak about 30-35 feet from gate house water side of dam. Also several bad leaks along foot of embankment.

WHEEL  Kind  Size  Rated H. P.

Location  Ave. Head

Evidence of Leaks in Structure

Recent Repairs and Date

Topography of Country below Dam

Nature of Buildings and Roads below Dam

Number of Acres in Pond  Drainage Area in Square Miles

Discharge in Second Feet per Square Mile

Estimated Storage Million Cubic Feet

WORCESTER COUNTY ENGINEER

Inspection of Dams, Reservoir Dams, and Reservoirs

Inspected by E. S. Grover Date 10-18-38 Dam No. 14-10

Town Dudley Location W. Charlton Road

Owner Stevens Linen Works Use \_\_\_\_\_

SPILLWAY 28'4 long x 1'6" above crest  
 El. top abutment \_\_\_\_\_ El. Crest 1" W.L. El. Apron \_\_\_\_\_ El. St. Bed \_\_\_\_\_  
 Width top Abut. \_\_\_\_\_ Width top Crest 16" Width bottom Sp. way \_\_\_\_\_  
 Width flashboards none Kind Flashboards \_\_\_\_\_  
 El. Flowline Cleanout Pipe \_\_\_\_\_ Size and Kind Pipe \_\_\_\_\_  
 Kind of Foundation under Spillway rock  
 Condition OK below narrow outlet, Water 1" below crest

EMBANKMENT crest  
 E. Top 2'0" above El. Natural Ground \_\_\_\_\_ Width Top 22'0"  
 Width of Borrom \_\_\_\_\_ Upstream Slope gravel Downstream Slope Masonry  
 Kind of Corewall 2" wood Piprap none  
 Material in Embankment Gravel backed by masonry Foundation \_\_\_\_\_  
 Condition OK except for seepage at XX in sketch

GATES Location \_\_\_\_\_  
 Size \_\_\_\_\_ Kind \_\_\_\_\_ El. Flowline \_\_\_\_\_  
 Condition \_\_\_\_\_

Evidence of Leaks in Structure \_\_\_\_\_

Recent Repairs and Date \_\_\_\_\_

Number Acres in Pond \_\_\_\_\_ Drainage Area in Sq. Miles \_\_\_\_\_  
 Discharge in Second Feet per Square Mile \_\_\_\_\_  
 Estimated Storage Million Cubic Feet \_\_\_\_\_





# COUNTY OF WORCESTER MASSACHUSETTS COUNTY ENGINEER

Inspection of Dams, Reservoir Dams, and Reservoirs

Inspected by K.M. Finlayson Date 3-23-1939 Dam No. 14-10

Town Dudley Location Hayden Reservoir

Owner Stevens Linc Works Use

Material and Type  Measured

Dam Designed by  Constructed by  Year

## SPILLWAY

El. top Abutment  El. Crest  El. Apron  El. Streambed

Width top Abutment  Width top Crest  Width bottom Spillway



Topography of Country below Dam

Nature of Buildings and Roads below Dam

Number Acres in Pond  Drainage Area in Square Miles

Discharge in Second Feet per Square Mile

Estimated Storage Million Cubic Feet

WORCESTER COUNTY ENGINEER			
Inspection of Dams, Reservoir Dams, and Reservoirs			
M.M. Healey			
Inspected by L.O. Marden-J.B. Lowell Date 4-17-1939 Dam No. 17			
Town	Dudley	Location	Hayden Reservoir
Owner	Stevens Linen Works	Use	
SPILLWAY			
El. top abutment	El. Crest	El. Apron	El. St. Bed
Width top Abut.	Width top Crest	Width bottom Sp. way	
Width flashboards	Kind Flashboards		
El. Flowline Cleanout Pipe	Size and Kind Pipe		
Kind of Foundation under Spillway			
Condition Discuss raising the abutment walls to this spillway at least two feet, or perhaps lowering same- should raise embankment-riprap same			
EMBANKMENT			
El. Top	El. Natural Ground	Width Top	
Width of Bottom	Upstream Slope	Downstream Slope	
Kind of Corewall	Riprap		
Material in Embankment	Foundation		
Condition			
GATES			
Size	Kind	El. Flowline	
Condition			
Evidence of Leaks in Structure			
Recent Repairs and Date			
Number Acres in Pond		Drainage Area in Sq. Miles	
Discharge in Second Feet per Square Mile			
Estimated Storage Million Cubic Feet			

# COUNTY OF WORCESTER MASSACHUSETTS COUNTY ENGINEER

Inspection of Dams, Reservoir Dams, and Reservoirs

Inspected by W.D. Lundquist Date Dec. 11, 1940 Dam No. 1728

Town DUDLEY Location Hayden Pond

Owner \_\_\_\_\_ Use \_\_\_\_\_

Material and Type \_\_\_\_\_

Dam Designed by \_\_\_\_\_ Constructed by \_\_\_\_\_ Year \_\_\_\_\_

## SPILLWAY

El. top Abutment \_\_\_\_\_ El. Crest \_\_\_\_\_ El. Apron \_\_\_\_\_ El. Streambed \_\_\_\_\_

Width top Abutment \_\_\_\_\_ Width top Crest \_\_\_\_\_ Width bottom Spillway \_\_\_\_\_

Width Flashboards carried \_\_\_\_\_ Kind Flashboards \_\_\_\_\_

El. Flowline Cleanout Pipe \_\_\_\_\_ Size and Kind Cleanout Pipe \_\_\_\_\_

Kind of Foundation under Spillway \_\_\_\_\_

Condition OK Dam seems to be in good condition but Pond is empty.

## EMBANKMENT

El. Top \_\_\_\_\_ El. Natural Ground \_\_\_\_\_ Width Top \_\_\_\_\_

Width of Bottom \_\_\_\_\_ Upstream Slope \_\_\_\_\_ Downstream Slope \_\_\_\_\_

Kind of Corewall \_\_\_\_\_ Riprap \_\_\_\_\_

Material in Embankment \_\_\_\_\_ Foundation \_\_\_\_\_

Condition OK

## GATES

Location \_\_\_\_\_

Size \_\_\_\_\_ Kind \_\_\_\_\_ El. Flowline \_\_\_\_\_

Condition OK Wide open

WHEEL \_\_\_\_\_ Kind \_\_\_\_\_ Size \_\_\_\_\_ Rated H. P. \_\_\_\_\_

Location \_\_\_\_\_ Ave. Head \_\_\_\_\_

Evidence of Leaks in Structure \_\_\_\_\_

Recent Repairs and Date \_\_\_\_\_

Topography of Country below Dam \_\_\_\_\_

Nature of Buildings and Roads below Dam \_\_\_\_\_

Number Acres in Pond \_\_\_\_\_ Drainage Area in Square Miles \_\_\_\_\_

Discharge in Second Feet per Square Mile \_\_\_\_\_

Estimated Storage Million Cubic Feet \_\_\_\_\_

WORCESTER COUNTY ENGINEER

Inspection of Dams, Reservoir Dams, and Reservoirs

Inspected by W. E. Col. Date 12-30-41 Dam No. 11-10

Town Endicott Location Hayden Pond

Owner \_\_\_\_\_ Use \_\_\_\_\_

**SPILLWAY**

El. top abutment \_\_\_\_\_ El. Crest \_\_\_\_\_ El. Apron \_\_\_\_\_ El. St. Bed \_\_\_\_\_

Width top Abut. \_\_\_\_\_ Width top Crest \_\_\_\_\_ Width bottom Sp. way \_\_\_\_\_

Width flashboards \_\_\_\_\_ Kind Flashboards \_\_\_\_\_

El. Flowline Cleanout Pipe \_\_\_\_\_ Size and Kind Pipe \_\_\_\_\_

Kind of Foundation under Spillway \_\_\_\_\_

Condition Pond still drawn down  
No new repairs

**EMBANKMENT**

El. Top \_\_\_\_\_ El. Natural Ground \_\_\_\_\_ Width Top \_\_\_\_\_

Width of Bottom \_\_\_\_\_ Upstream Slope \_\_\_\_\_ Downstream Slope \_\_\_\_\_

Kind of Corewall \_\_\_\_\_ Riprap \_\_\_\_\_

Material in Embankment \_\_\_\_\_ Foundation \_\_\_\_\_

Condition No leaks

**GATES** \_\_\_\_\_ Location \_\_\_\_\_

Size \_\_\_\_\_ Kind \_\_\_\_\_ El. Flowline \_\_\_\_\_

Condition Gate open

Evidence of Leaks in Structure \_\_\_\_\_

Recent Repairs and Date \_\_\_\_\_

Number Acres in Pond \_\_\_\_\_ Drainage Area in Sq. Miles \_\_\_\_\_

Discharge in Second Feet per Square Mile \_\_\_\_\_

Estimated Storage Million Cubic Feet \_\_\_\_\_



WORCESTER COUNTY ENGINEER

Inspection of Dams, Reservoir Dams, and Reservoirs

Inspected by J. L. A. Harris Date 12-10-42 Dam No. 19-10

Town Dudley Location Hudson Res.

Owner St. Lawrence Mill & Lumber Co. Use Storage

SPILLWAY

El. top Abutment \_\_\_\_\_ El. Crest \_\_\_\_\_ El. Apron \_\_\_\_\_ El. St. Bed \_\_\_\_\_

Width top Abut. \_\_\_\_\_ Width top Crest \_\_\_\_\_ Width bottom Sp. way \_\_\_\_\_

Width flashboards none Kind Flashboards \_\_\_\_\_

El. Flowline Cleanout Pipe \_\_\_\_\_ Size and Kind Pipe \_\_\_\_\_

Kind of Foundation under Spillway \_\_\_\_\_

Condition Good No water over - See log

repair date 19-10

EMBANKMENT

El. Top \_\_\_\_\_ El. Natural Ground \_\_\_\_\_ Width Top \_\_\_\_\_

Width of Bottom \_\_\_\_\_ Upstream Slope \_\_\_\_\_ Downstream Slope \_\_\_\_\_

Kind of Corewall \_\_\_\_\_ Riprap \_\_\_\_\_

Material in Embankment Rubble & Earth Foundation \_\_\_\_\_

Condition \_\_\_\_\_

GATES

1 - open Location \_\_\_\_\_

Size \_\_\_\_\_ Kind \_\_\_\_\_ El. Flowline \_\_\_\_\_

Condition good

Evidence of Leaks in Structure none several leaks

on secondary embankment

Recent Repairs and Date none

Number Acres in Pond \_\_\_\_\_ Drainage Area in Sq. Miles \_\_\_\_\_

Discharge in Second Feet per Square Mile \_\_\_\_\_

Estimated Storage Million Cubic Feet \_\_\_\_\_

# COUNTY OF WORCESTER MASSACHUSETTS

## COUNTY ENGINEER

Inspection of Dams, Reservoir Dams, and Reservoirs

Inspected by

Date

Dam No.

Town

Location

Owner

Use

Material and Type

Dam Designed by

Constructed by

Year

### SPILLWAY

El. top Abutment

El. Crest

El. Apron

El. Streambed

Width top Abutment

Width top Crest

Width bottom Spillway

Width Flashboards carried

Kind Flashboards

El. Flowline Cleanout Pipe

Size and Kind Cleanout Pipe

Kind of Foundation under Spillway

Condition

### EMBANKMENT

El. Top

El. Natural Ground

Width Top

Width of Bottom

Upstream Slope

Downstream Slope

Kind of Corewall

Riprap

Material in Embankment

Foundation

Condition

### GATES

Location

Size

Kind

El. Flowline

Condition

### WHEEL

Kind

Size

Rated H. P.

Location

Ave. Head

Evidence of Leaks in Structure

Recent Repairs and Date

Topography of Country below Dam

Nature of Buildings and Roads below Dam

Number Acres in Pond

Drainage Area in Square Miles

Discharge in Second Feet per Square Mile

Estimated Storage Million Cubic Feet

# COUNTY OF WORCESTER MASSACHUSETTS

## COUNTY ENGINEER

Inspection of Dams, Reservoir Dams, and Reservoirs.

Inspected by

*R. M. Furlan*

Date *12-10-41*

Dam No.

*1410*

Town

*Dudley*

Location

*Hayden Pond*

Owner

*Hayden River*

Use

*Water*

Material and Type

Dam Designed by

Constructed by

### SPILLWAY

El. top Abutment

El. Crest

El. Apron

El. Streambed

Width top Abutment

Width top Crest

Width bottom Spillway

Width Flashboards carried

Kind Flashboards

El. Flowline Cleanout Pipe

Size and Kind Cleanout Pipe

Kind of Foundation under Spillway

Condition

*Structure ok - cut gravel in spillway  
Pond 4' below flow line*

### EMBANKMENT

El. Top

El. Natural Ground

Width Top

Width of Bottom

Upstream Slope

Downstream Slope

Kind of Corewall

Riprap

Material in Embankment

Foundation

Condition

*Seepage for length of 20' indicated  
down*

### GATES

Size

Kind

Location

El. Flowline

Condition

### WHEEL

*None*

Kind

Size

Rated H. P.

Location

Ave. Head

Evidence of Leaks in Structure

Recent Repairs and Date

Topography of Country below Dam

Nature of Buildings and Roads below Dam

Number Acres in Pond

Drainage Area in Square Miles

Discharge in Second Feet per Square Mile

Estimated Storage Million Cubic Feet



TOWN DudleyTHIS DAM  
NEEDS ATTENTIONDAM NO. 14-10LOCATION Hayden Reservoir

STREAM \_\_\_\_\_

WORCESTER COUNTY ENGINEERING DEPARTMENT  
WORCESTER, MASSACHUSETTS

## DAM INSPECTION REPORT

OWNED BY Stevens Line Associates PLACE Dudley USE storageINSPECTED BY E.V. Meagher LOM DATE Dec. 1, 1947TYPE OF DAM high earth emb.-downstream stone wall CONDITION fair  
s one spillway with concrete crestSPILLWAYFLASHBOARDS IN PLACE none RECENT REPAIRS noneCONDITION Good, but new concrete abutments should be built  
capacity of spillway about enough for 1975 flood-needs higher sts.  
REPAIRS NEEDED \_\_\_\_\_EMBANKMENTRECENT REPAIRS brush should be cut, roots grubbed out in top  
and face of embankment. Could raise embankment at least 12 inches.

CONDITION \_\_\_\_\_

REPAIRS NEEDED See above statementGATESRECENT REPAIRS noneCONDITION gate OK, but should mortar joints in stone  
supporting walls of forebay.  
REPAIRS NEEDED \_\_\_\_\_LEAKSGood sized leaks exist at gate section-along downstream face  
of the embankment wall and embankment.DATE Dec. 1, 1947L. O. Mardin  
COUNTY ENGINEER

APPENDIX B-16

TOWN Dudley  
LOCATION Hayden Reservoir

DAM NO. 14-10

STREAM \_\_\_\_\_

WORCESTER COUNTY ENGINEERING DEPARTMENT  
WORCESTER, MASSACHUSETTS

**DAM INSPECTION REPORT**

OWNED BY Stevens Linen Associates, Inc. PLACE Dudley USE Storage  
INSPECTED BY L.O.M. DATE Dec. 2, 1958  
TYPE OF DAM High earth emb. - Stone wall CONDITION Fair to good

**SPILLWAY**

FLASHBOARDS IN PLACE None RECENT REPAIRS None

CONDITION \_\_\_\_\_

REPAIRS NEEDED Should raise abt 2'-0" for increased capacity. or lower spillway crest

**EMBANKMENT**

RECENT REPAIRS None

CONDITION Sh.

REPAIRS NEEDED Should raise 24" leaks see below

**GATES**

RECENT REPAIRS None

CONDITION appears OK

REPAIRS NEEDED -

**LEAKS**

HOW SERIOUS Good sized leak at gate section - 1700  
thru emb at East Dike Section

DATE Dec. 2, 1958

L.O. Marden  
COUNTY ENGINEER

TOWN <u>Dudley</u>	DAM NO. <u>100</u>
LOCATION <u>Hayden Pond</u>	STREAM <u>Hayden Pond</u>
<b>WORCESTER COUNTY ENGINEERING DEPARTMENT</b> <b>WORCESTER, MASSACHUSETTS</b> <b>DAM INSPECTION REPORT</b>	
OWNED BY <u>Stevens Union Co</u>	PLACE <u>USE</u> <u>None</u>
INSPECTED BY <u>Lt Spafford</u>	DATE <u>11/21/57</u>
TYPE OF DAM <u>Stone Breast Wall</u>	CONDITION <u>Good</u>
<b>SPILLWAY</b>	
FLASHBOARDS IN PLACE <u>None</u>	RECENT REPAIRS <u>None</u>
CONDITION <u>Good</u>	
REPAIRS NEEDED <u>None</u>	
<b>EMBANKMENT</b>	
RECENT REPAIRS <u>None</u>	
CONDITION <u>Good</u>	
REPAIRS NEEDED <u>None</u>	
<b>GATES</b>	
RECENT REPAIRS <u>New lead screw put in in 1950</u>	
CONDITION <u>Good</u>	
REPAIRS NEEDED <u>None</u>	
<b>LEAKS</b>	
HOW SERIOUS <u>2 Old leaks - one at gate and one at mid point of Embankment - both old - not particularly dangerous</u>	
DATE _____	
COUNTY ENGINEER _____	

TOWN <u>Dudley</u>	DAM NO. <u>210</u>
LOCATION _____	STREAM _____
<b>WORCESTER COUNTY ENGINEERING DEPARTMENT</b> <b>WORCESTER, MASSACHUSETTS</b> <b>DAM INSPECTION REPORT</b>	
OWNED BY _____	PLACE _____
INSPECTED BY <u>LHS. &amp; LHS.</u>	DATE <u>Sept. 13, 1955</u>
TYPE OF DAM _____	CONDITION _____
<b>SPILLWAY</b>	
FLASHBOARDS IN PLACE _____	RECENT REPAIRS _____
CONDITION <u>OK</u>	
REPAIRS NEEDED _____	
<b>EMBANKMENT</b>	
RECENT REPAIRS _____	
CONDITION <u>OK</u>	
REPAIRS NEEDED _____	
<b>GATES</b>	
RECENT REPAIRS _____	
CONDITION <u>Small Gate - lead screw taking out of discharge</u>	
REPAIRS NEEDED _____	
<b>LEAKS</b>	
HOW SERIOUS _____	
	DATE _____
	COUNTY ENGINEER _____

TOWN Dudley DAM NO. N-12-103

LOCATION Watershed at Harbor Rd. STREAM New Pond Brook

on a dirt road New Pond

WORCESTER COUNTY ENGINEERING DEPARTMENT  
WORCESTER, MASSACHUSETTS

### DAM INSPECTION REPORT

Owned by Stevens Linear Associates Place Dudley Use Storage Pond

Inspected by WOL Date Oct 25, 1963

Type of Dam Earth, stone and concrete Condition Poor

#### SPILLWAY

Flashboards in Place No boards Recent Repairs

Condition This granite stone spillway has a concrete floor

Repairs Needed The height of this spillway is only 2' - very little

headroom. The crest should be lowered at least 2'.

#### EMBANKMENT

Recent Repairs The easterly embankment is 75' high and 24' wide on top

Condition The western down-slope wall is good except some old stone

Repairs Needed are missing. The westerly embankment is also 24' wide

(average) on top. Both of these embankments are covered with brush and trees

#### GATES

Recent Repairs

Condition The gate and gate house are good. The gate is open

Repairs Needed The water level on this date is about 6' below the

spillway crest

#### LEAKS

How Serious No leaks are visible

DATE: \_\_\_\_\_ County Engineer: \_\_\_\_\_

TOWN Dudley DAM NO. 4-104

LOCATION Walden Pond Rd. STREAM New Pond Brook

New Pond

WORCESTER COUNTY ENGINEERING DEPARTMENT  
WORCESTER, MASSACHUSETTS

### DAM INSPECTION REPORT

Owned by Same as for 14-10 Place Dudley Use Storage pond

Inspected by WGL Date Oct. 25, 1963

Type of Dam Earth dike Condition Fair

#### SPILLWAY

Flashboards in Place \_\_\_\_\_ Recent Repairs \_\_\_\_\_

Condition No spillways at this dike

Repairs Needed This is a long earth dike located on the outside of the pond and extends north to the main dam

#### EMBANKMENT

Recent Repairs This embankment is 15' to 20' high - 6' to 12' wide

Condition on top - 1 1/2 to 1 slopes - there is some small stone

Repairs Needed repair the upstream slope. It is covered with brush and large trees

#### GATES

Recent Repairs \_\_\_\_\_

Condition No gates

Repairs Needed There is a 20' air pond 4' deep just below the head of this earth dike. This water probably comes from seepage through this dike

#### LEAKS

How Serious \_\_\_\_\_

DATE: \_\_\_\_\_ County Engineer



TOWN Dudley DAM NO. 1416  
LOCATION 2500 Weymouth Rd STREAM New Pond  
Chayden Pond Brook

WORCESTER COUNTY ENGINEERING DEPARTMENT  
WORCESTER, MASSACHUSETTS

DAM INSPECTION REPORT

Owned by Stevens Linen Assoc's Place Dudley Use Storage  
Inspected by FFP-WOL Date May 15, 1964  
Type of Dam Earth and Stone Condition Fair

SPILLWAY

Flashboards in Place No boards Recent Repairs  
Condition Spillway area is too small - more free board should  
Repairs Needed be provided - water level is too high

EMBANKMENT

Recent Repairs No recent repairs  
Condition Brush and dead trees should be removed from dam  
Repairs Needed No maintenance to this dam for many years  
Missing stones on downstream wall should be replaced and wall repaired

GATES

Recent Repairs  
Condition Gate is partly open - gate is located in locked gate house  
Repairs Needed

LEAKS

How Serious No leaks visible

DATE:

County Engineer

TOWN Dudley DAM NO. 10-10

LOCATION 200 meters - Vermont Rd. STREAM New Pond

WORCESTER COUNTY ENGINEERING DEPARTMENT  
WORCESTER, MASSACHUSETTS

### DAM INSPECTION REPORT

Owned by Worcester Line Associates, Inc. Place Dudley Use Storage Pond

Inspected by W.C. Date Aug. 29, 1968

Type of Dam Earth and stone dam Condition Fair to good

#### SPELLWAY

Flashboards in Place No boards Recent Repairs

Condition Provide accurate section on the upstream side of the spillway - flat

Repairs Needed about spillway. The abutment walls should be extended to the crest

to 10' for each wall. The water level is 1.5' below the crest.

#### EMBANKMENT

Recent Repairs The downstream wall is 30' high with some of the top stones

Condition missing. There are 3 or 4 leaks visible below this wall.

Repairs Needed (14-10A) There is a 300' long earth dike Northeast of the gate and at the

dam. It is 6 to 30' wide and 6 to 15' high - with logs, trees and brush on top and slopes

on top of the upstream slope. There are 2 or 3 seepage pools below this dike.

#### GATES

Recent Repairs The small wood gate house is leaked. The gate leaks at the outlet

Condition (14-10B) There is a large leak at the old 2' x 2' canal gate. The old canal

Repairs Needed is located 50' above the bank - is 500' long or 300' beyond the next line

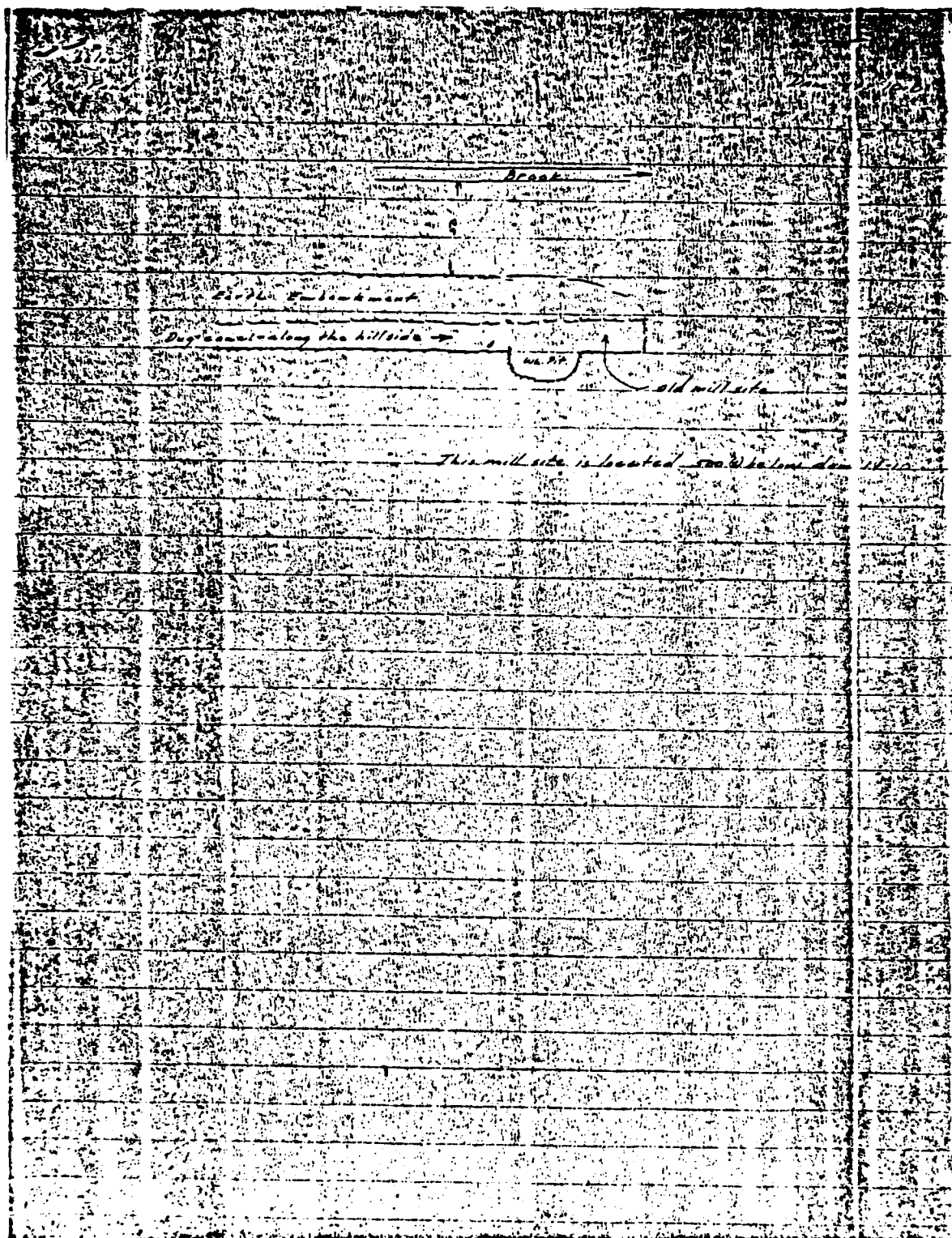
the 3' wide, walled canal - the old wheel pit and the old mill site are still in place.

#### LEAKS

How Serious

DATE: \_\_\_\_\_ County Engineer





TOWN DudleyDAM NO. 14-10Hayden PondLOCATION                     STREAM                     WORCESTER COUNTY ENGINEERING DEPARTMENT  
WORCESTER, MASSACHUSETTS

## DAM INSPECTION REPORT

Owned by                     Place                     Use                     Inspected by ReynoldsDate                     Type of Dam                     Condition                     

## SPILLWAY

Flashboards in Place NoneRecent Repairs                     Condition White Pond is 3 ft below crestRepairs Needed None

## EMBANKMENT

Recent Repairs                     Condition                     Repairs Needed                     

## GATES

Recent Repairs                     Condition                     Repairs Needed                     

## LEAKS

How Serious                     DATE 2/10/69County Engineer's Signature

# INSPECTION REPORT & DATA FOR DAMS

Owner: STEVENS LINE ASSOC. INC  
His Address: MILL ST  
Function of Dam: STORAGE RESEVOIR

Dam No. 14-10  
Town: DUDLEY  
Stream: BROOK  
Pond: HAYDEN POND  
Date: 3/9/72  
By: T. Fichler

Location & Access: 10 MILE WEST ON HAYDEN RD  
FROM JCT OF PIERPONT & HAYDEN RDS TO  
USGS Quad. WEBSTER Lat. 42-04-15 Long. 72-55-10  
Drain. Ar.: 1.97 Sq. Mi. Ponds: 93 ac.; Res. @ dam: ---  
Character of D.A.: ---

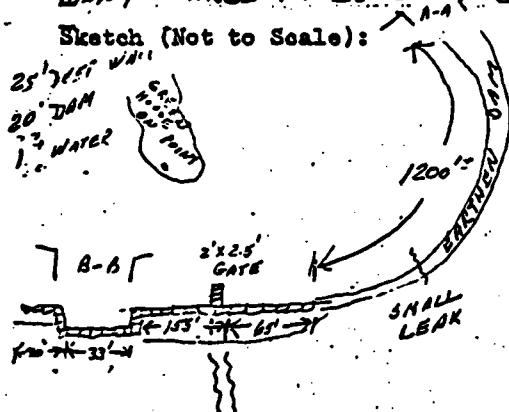
CONDITION RATING  
Structural: GOOD  
Hydraulic: 33' x 1' + 2' x 2.5' GAT  
General: GOOD  
PRIORITY: NONE

Estimated  
Discharge: ---  
Capacity: ---

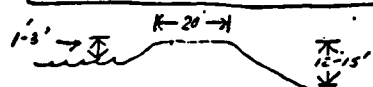
## General Description of Dam and Discharge Control:

283' STON MASONRY DAM INCLUDES SPILLWAY (NO SLOTS FOR FLESHBOL)  
1200'± EARTHEN DAM. ONE LEAK EAST OF GATE.  
MANY LARGE TREES ON DAM & DAM FACES.

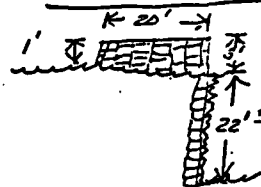
## Sketch (Not to Scale):



## A-A DAM END VIEW



## B-B STONE MASONRY SPILLWAY SIDE VIEW



## Remarks and Recommendations:

N

Date  
2/9/72

By  
R. Fichler  
V. P.  
E. M.

Comment

Dam No. 3-14-10-10

## APPENDIX C

### SELECTED PHOTOGRAPHS OF PROJECT

#### LOCATION PLAN

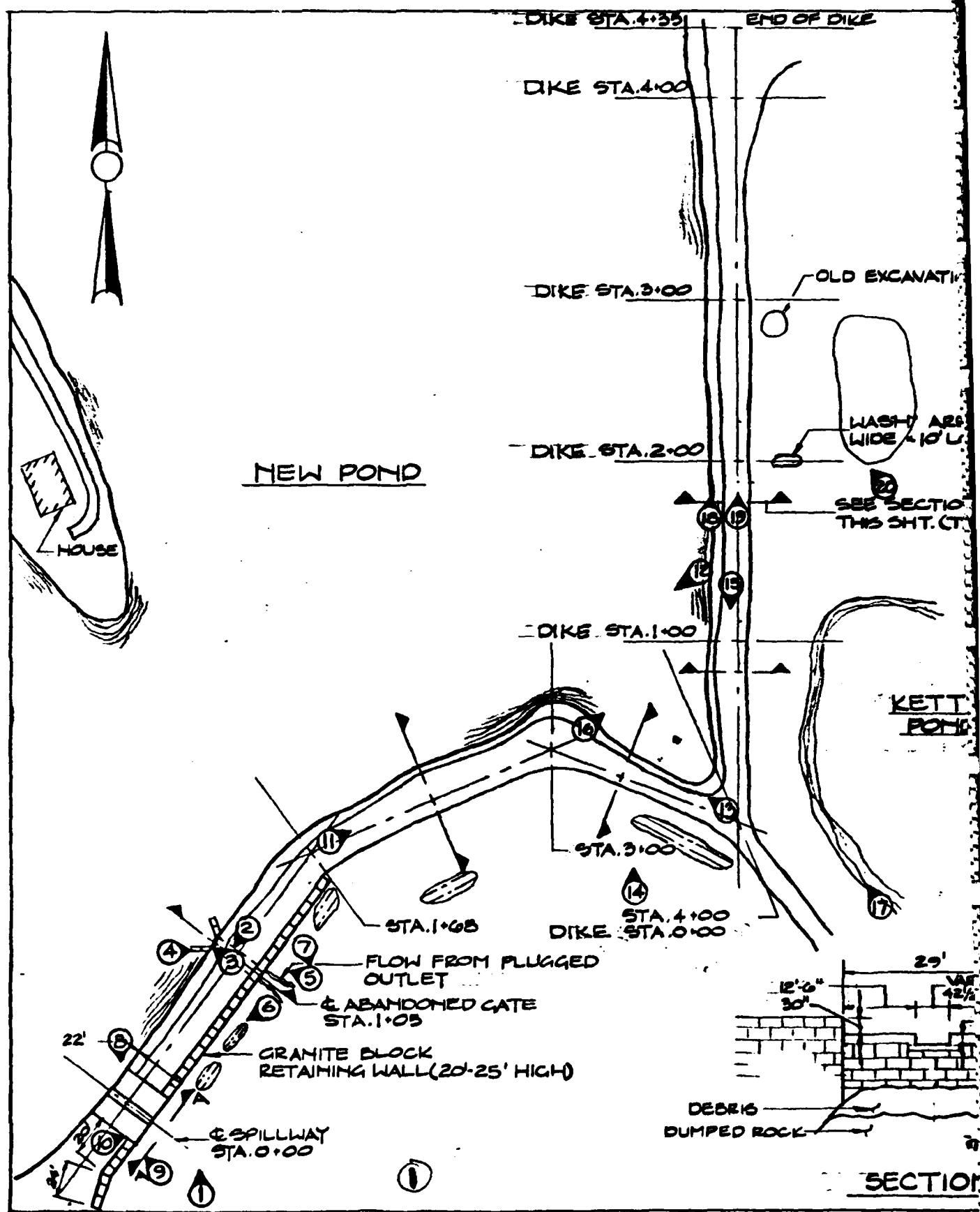
Location of Photographs

Page No.

C-1

#### PHOTOGRAPHS

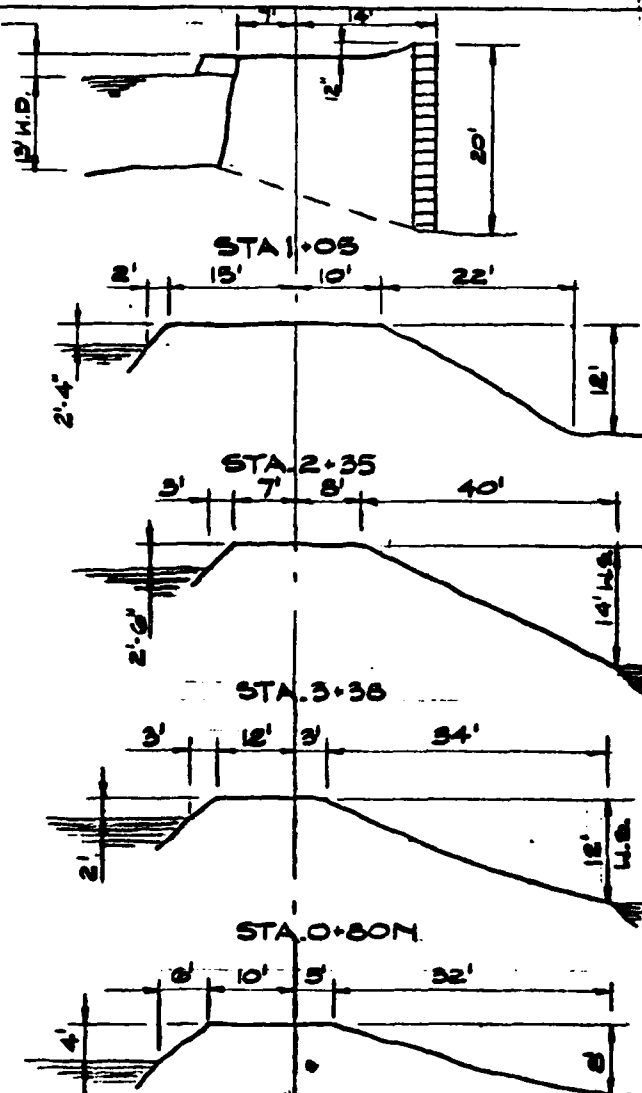
<u>No.</u>	<u>Title</u>	<u>Page No.</u>
1.	Overview of Dam and Dike from Across the Pond	C-2
2.	Crest of Dam from Outlet Works to the Right Abutment	C-2
3.	Intake Channel of the Outlet Works	C-3
4.	Stone Masonry Walls of Outlet Works Intake Channel	C-3
5.	Downstream Face of Dam and Discharge End of Outlet Conduit	C-3
6.	Stone Masonry Wall at Downstream Face of Dam	C-4
7.	Terrain Downstream of Outlet Works Discharge Conduit	C-4
8.	View of Spillway from Upstream	C-5
9.	View of Spillway from Downstream	C-5
10.	Channel Downstream of Spillway	C-6
11.	View Northeast of Station 1+50+ Along Crest of Dam	C-6
12.	View of Upstream Face of Dam Between Stations 3+00+ and 4+00+	C-7
13.	View of Crest of Dam from Station 4+00+ Towards Station 3+00	C-7
14.	Slight Seepage Downstream of Dam at Station 3+50+	C-8
15.	View of Crest of Dike from Dike Station 1+25+ Towards Dike Station 0+00	C-8
16.	View of Upstream Face of Dike Between Dike Station 0+50+ To Station 2+00+	C-9
17.	View of Downstream Face of Dike Between Dike Station 0+50+ To Station 1+50+ and Kettle Pond from Access Road	C-9
18.	Riprap at Upstream Face of Dike at Approximately Station 2+00	C-10
19.	View of Dike Crest Looking North From Dike Station 1+80+	C-10
20.	Small Seepage Pond at Downstream Face of Dike at Approximate Dike Station 2+50+	C-11



APPEND C-1

3 OF DIKE

1-11"

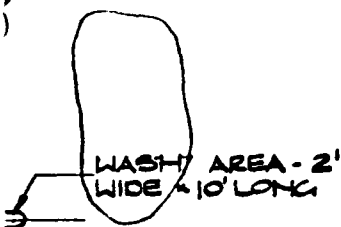


SECTIONS

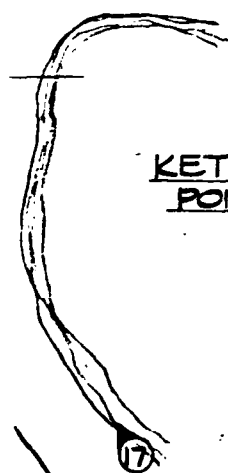
NOTES:

1. PLAN SKETCH BASED ON FIELD OBSERVATIONS BY CAMP, DRESSER & MCKEE, INC.
2. ① DENOTES PHOTOGRAPH NUMBER AND DIRECTION OF VIEW.
3. ≡≡≡ DENOTES AREA OF OBSERVED SEEPAGE

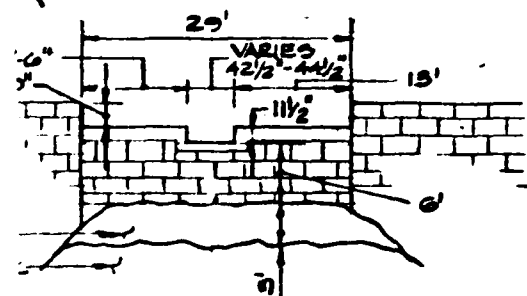
OLD EXCAVATION



SEE SECTIONS THIS SHT. (TYP)



KETTLE POND



SECTION A-A

②

CAMP DRESSER & MCKEE, INC.  
BOSTON, MASSACHUSETTS

U.S. ARMY ENGINEER DIV. NEW ENGLAND  
CORPS OF ENGINEERS  
WALTHAM, MA.

NATIONAL PROGRAM OF INSPECTION OF NON FED. DAMS

NEW POND DAM  
SITE PLAN SKETCH

NEW POND

MASSACHUSETTS

DATE: SEPT. 1978

SCALE: NONE

APPENDIX C-1



2. CREST OF DAM FROM OUTLET WORKS TO THE RIGHT ABUTMENT.



3. INTAKE CHANNEL OF THE OUTLET WORKS.



4. STONE MASONRY WALLS OF OUTLET WORKS INTAKE CHANNEL.



5. DOWNSTREAM FACE OF DAM AND DISCHARGE  
END OF OUTLET CONDUIT.





6. STONE MASONRY WALL AT DOWNSTREAM FACE OF DAM.



7. TERRAIN DOWNSTREAM OF OUTLET WORKS DISCHARGE CONDUIT.



8. VIEW OF SPILLWAY FROM UPSTREAM.



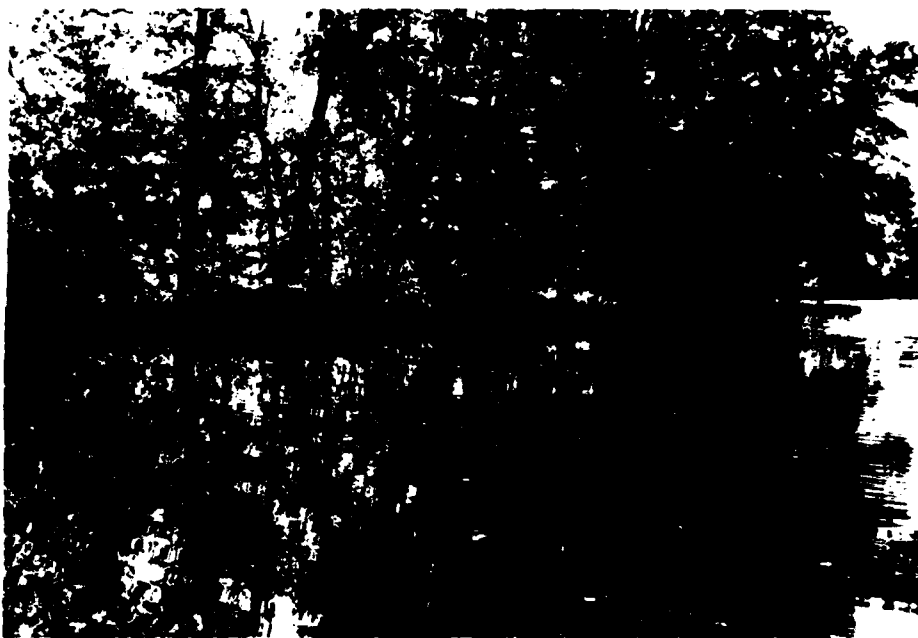
9. VIEW OF SPILLWAY FROM DOWNSTREAM.



10. CHANNEL DOWNSTREAM OF SPILLWAY.



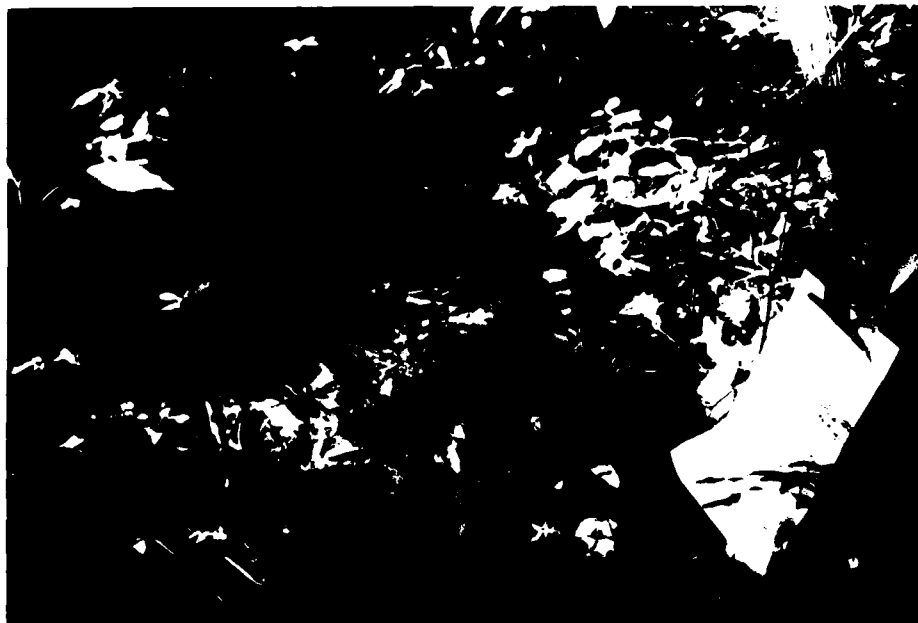
11. VIEW NORTHEAST OF STATION 1+50+ ALONG CREST OF DAM.



12. VIEW OF UPSTREAM FACE OF DAM BETWEEN STATIONS 3+00+ AND 4+00+.



13. VIEW OF CREST OF DAM FROM STATION 4+00+ TOWARDS STATION 3+00.



14. SLIGHT SEEPAGE DOWNSTREAM OF DAM AT STATION 3+50+.



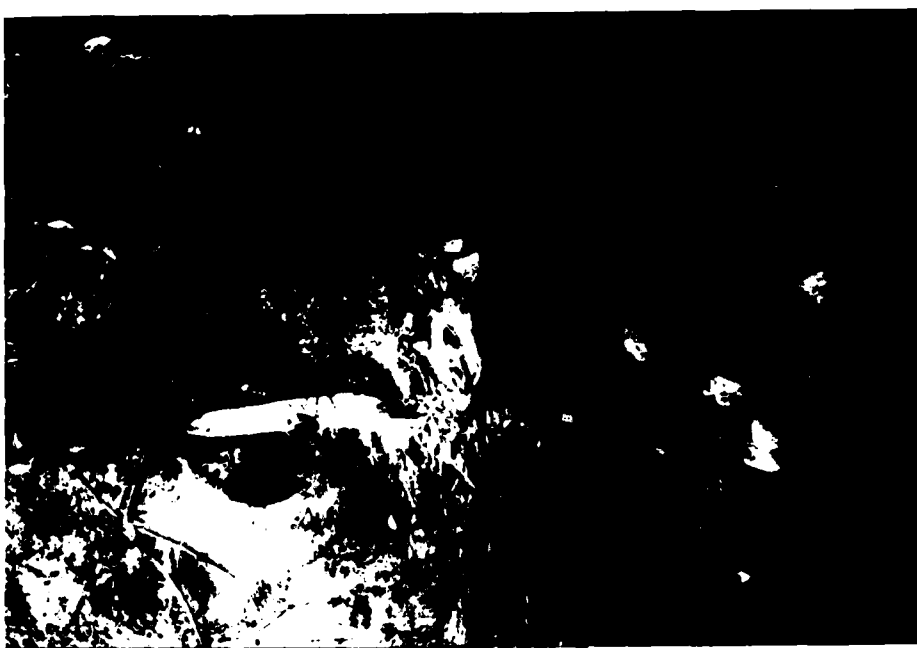
15. VIEW OF CREST OF DIKE FROM DIKE STATION 1+25+ TOWARDS  
DIKE STATION 0+00.



16. VIEW OF UPSTREAM FACE OF DIKE BETWEEN DIKE STATION  
0+50+ TO STATION 2+00+ FROM DAM STATION 3+00.



17. VIEW OF DOWNSTREAM FACE OF DIKE BETWEEN DIKE STATIONS  
0+50+ AND 1+50+ AND KETTLE POND FROM ACCESS ROAD.



18. RIPRAP AT UPSTREAM FACE OF DIKE AT  
APPROXIMATELY DIKE STATION 2+00.



19. VIEW OF DIKE CREST LOOKING NORTH FROM  
DIKE STATION 1+80+



20. SMALL SEEPAGE POND AT DOWNSTREAM FACE OF DIKE  
AT APPROXIMATELY DIKE STATION 2+50.

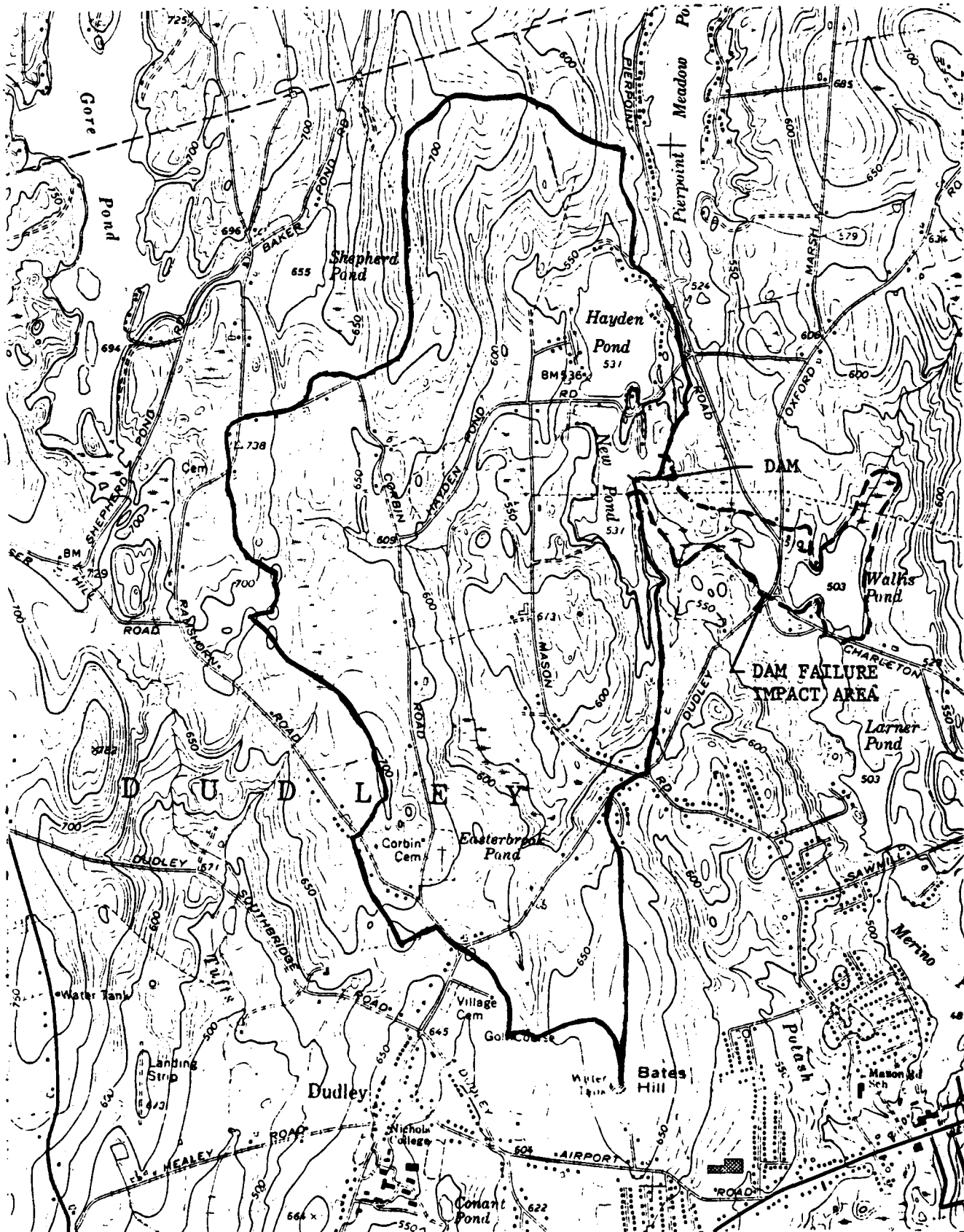


APPENDIX D  
OUTLINE OF DRAINAGE AREA AND  
HYDRAULIC COMPUTATIONS

Page No.

COMPUTATIONS

Drainage Area Map	D-1
Drainage Area and Surface Areas	D-2
Field Sketch of Dam	D-3
Elevations and Storage Determination	D-4
Size Classification, Hazard Potential and	
Test Flood Determination	D-5
Spillway Rating Curve	D-6
Test Flood Inflow Determination	D-7
Surcharge-Storage Routing	D-11
Stage-Discharge and Storage Curves	D-12
Tailwater Analysis	D-13
Dam Failure Analysis	D-16



**CAMP DRESSER & MCKEE Inc.**  
 Consulting Engineers  
 Boston, Mass.



**NEW POND DAM  
 DRAINAGE AREA MAP**  
 SCALE: 1" = 2000'

APPENDIX D-1

CAMP DRESSER & MCKEE  
Environmental Engineers  
Boston, Mass.

CLIENT COE  
PROJECT New Pond  
DETAIL HEAVEN & NEW PONDS (1)  
JOB NO. 380-5-01  
DATE CHECKED 1-17-79  
CHECKED BY Heater  
WESTER MASS-CONN. QUAD

PAGE 1  
DATE 8/11/79  
COMPUTED BY HAE

Scale of Mappings:  $1" = 2000'$   $\therefore 1 \text{ Sq. in} \times 91.63 = \text{Acres (A)}$

$\#A \div 640 = \text{mi}^2$

### DRAINAGE AREA

1. 14.17  
2. 28.40  
14.23 Ave = 14.20 Sq in = 1303.9 Acres = 2.037 Sq. mi.

### WATER SURFACES

EL. 531

1. 0.82  
2. 1.62  
0.80 Ave = 0.81 Sq in. = 74.4 A = 0.116 mi<sup>2</sup>

EL. 540

1. 1.34  
2. 2.59  
1.25 Ave = 1.30 in<sup>2</sup> = 118.9 A = 0.186 mi<sup>2</sup>

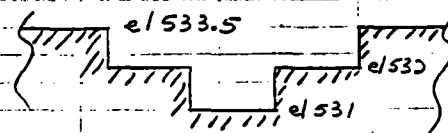
EL. 550

1. 2.03  
2. 4.04  
2.01 Ave = 2.02 in<sup>2</sup> = 185.5 A = 0.290 mi<sup>2</sup>



## ELEVATIONS

Spillway Crest 531  
Top of Dam 533  
Toe of Dam @ spillway 513  
Embankment 533



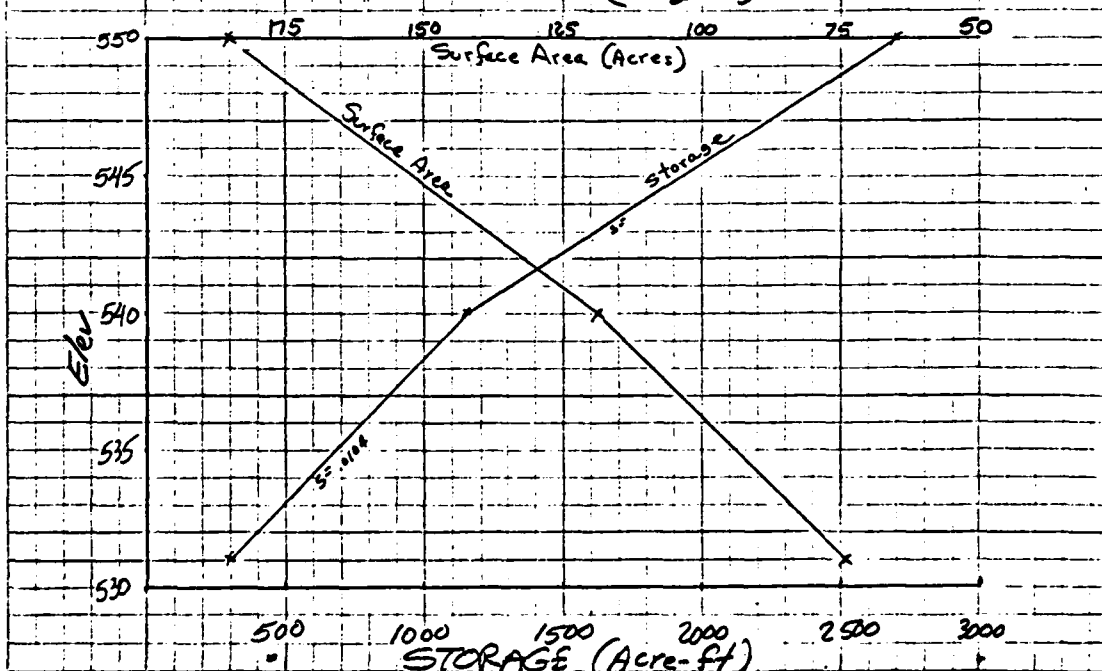
Water Surface el 531 from USGS topo assumed to be crest el. Other elevations obtained from field measurements relative to crest

## SURFACE AREAS

@ el 531: 74.4 Ac = 0.116 mi<sup>2</sup> (spillway crest)  
540: 118.9 Ac = 0.186 mi<sup>2</sup>  
550: 185.5 Ac = 0.290 mi<sup>2</sup>

## STORAGE CAPACITIES

@ spillway crest el 531  $V = \frac{1}{3}AH = \frac{1}{3}(74.4)(12) = 297.6 \text{ Ac-ft}$   
el 540  $V = \frac{(118.9 + 74.4)}{2}(9) + 297.6 = 1167 \text{ Ac-ft}$   
el 550  $V = \frac{(185.5 + 118.9)}{2}(10) + 1167 = 2689 \text{ Ac-ft}$



### SIZE CLASSIFICATION

Hydraulic Height: Top of Embankment = 533.0  
Toe of Dam @ Spillway 513.0  
20'

Size Classification based on height = Small

### Storage Capacities

@ El 531.0 = 2926 Ac-ft

@ El 533.0 = 500 Ac-ft

Size classification based on storage is small

∴ Size classification is Small

### HAZARD CLASSIFICATION

Discharge from New Pond is conveyed through a large swamp area adjacent to New Pond, through Wallis Pond and Larner Pond. These storage areas should significantly reduce flows from New Pond. There are a few houses around the latter named ponds. There are no other developments in this downstream area. The existing homes in this area may experience minor water damage in the event of a dam failure. The Dudley St - Oxford, Charlton Rd intersection may be overtopped by floodwaters but should not be washed out.

∴ hazard classification is low

### TEST FLOOD

Small size + low hazard → 50 yr to 100 yr

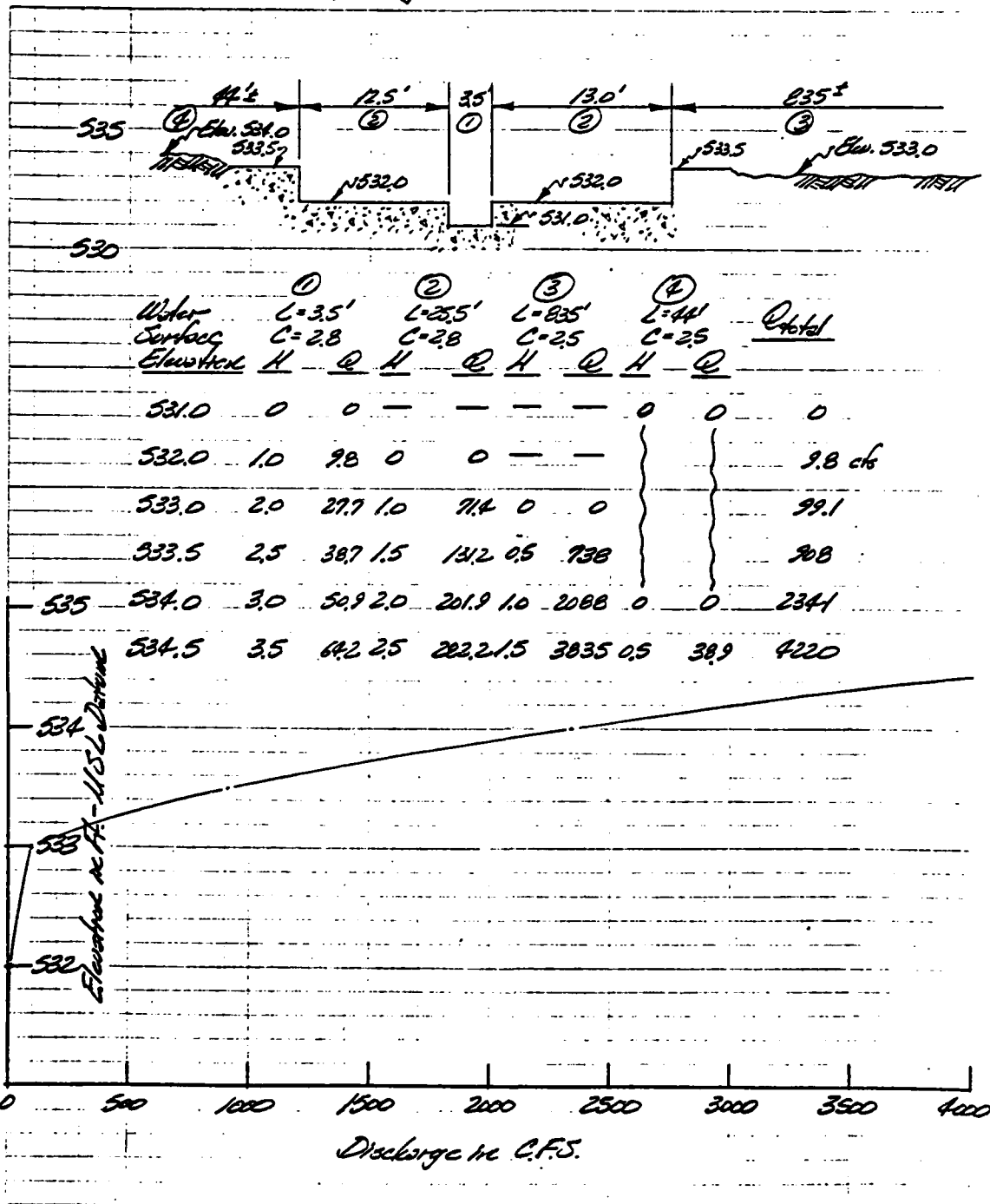
### DRAINAGE AREA

1304 acres = 2.04 mi<sup>2</sup> The drainage area is sparsely populated. The terrain is hilly with some upland marshy areas. There is an abundance of brush and trees throughout the area. The combined areas of New Pond + Hayden Pond occupy about 5.6% of the D.A.

CAMP DRESSER & MCKEE  
Environmental Engineers  
Boston, Mass.

CLIENT City of Cambridge Dam Improvement 380-5-01  
PROJECT New Pond Drain DATE CHECKED 20 Feb 1979  
DETAIL Spillway Rating Curve CHECKED BY JW

PAGE 4  
DATE Jan 19 1979  
COMPUTED BY CF Miller



### 100 YR INFLOW DETERMINATION

Use SCS TP-149 Method for Estimating Volume and Rate of Runoff in Small Watersheds

$$\text{Drainage Area} = 2.04 \text{ mi}^2$$

$$\text{slope} = (610 - 548) / 7760 = 0.0078$$

$$\text{Lag} = 2^{0.8(S+1)} / 1900(Y)^{0.5} \quad \text{where } L = 11,400 \text{ ft.}$$

$$Y = 0.78$$

$$S = 100 / \text{CN} - 10$$

### Curve Number (CN) Analysis

<u>Land Use</u>	<u>Area</u>	<u>CN</u>	<u>Area x CN</u>
Pond	73.5 ac.	100	7350
Meadow	1232 ac.	60	73,920
Woods	1305.5		81,270

$$\text{Wt. CN} = 81,270 / 1,305.5 = 62$$

$$S = 100 / 62 - 10 = 6.129$$

$$\text{Lag} = (11,400)^{0.8} (6.129 + 1)^{0.7} / 1900 (0.78)^{0.5} = 4.15 \text{ hrs.}$$

$$\text{AD} = 0.4 L = 0.4 \times 4.15 \text{ hrs} = 1.66 \text{ hrs.}$$

$$\text{TAD} = 7 \times 1.66 = 11.62 \text{ hrs.}$$

Assume midpoint @ max. increment of runoff is 11.62 hrs,  
then start of storm = 11.62 hrs - 4.5(1.66) = 4.41 hrs  
and time @ TAD = 4.41 + 11.62 = 16.03



100-yr. Flood Flow Determination - SCS Method

from comp. by JEDanning: Drainage Area = 2.04 sq. mi.

$P_{34} = 6.75$  "Rainfall  
for 100-yr. storm

$$CN = 62 \text{ (say } 65) \quad S = \frac{1000}{62} - 10 = 6.129$$

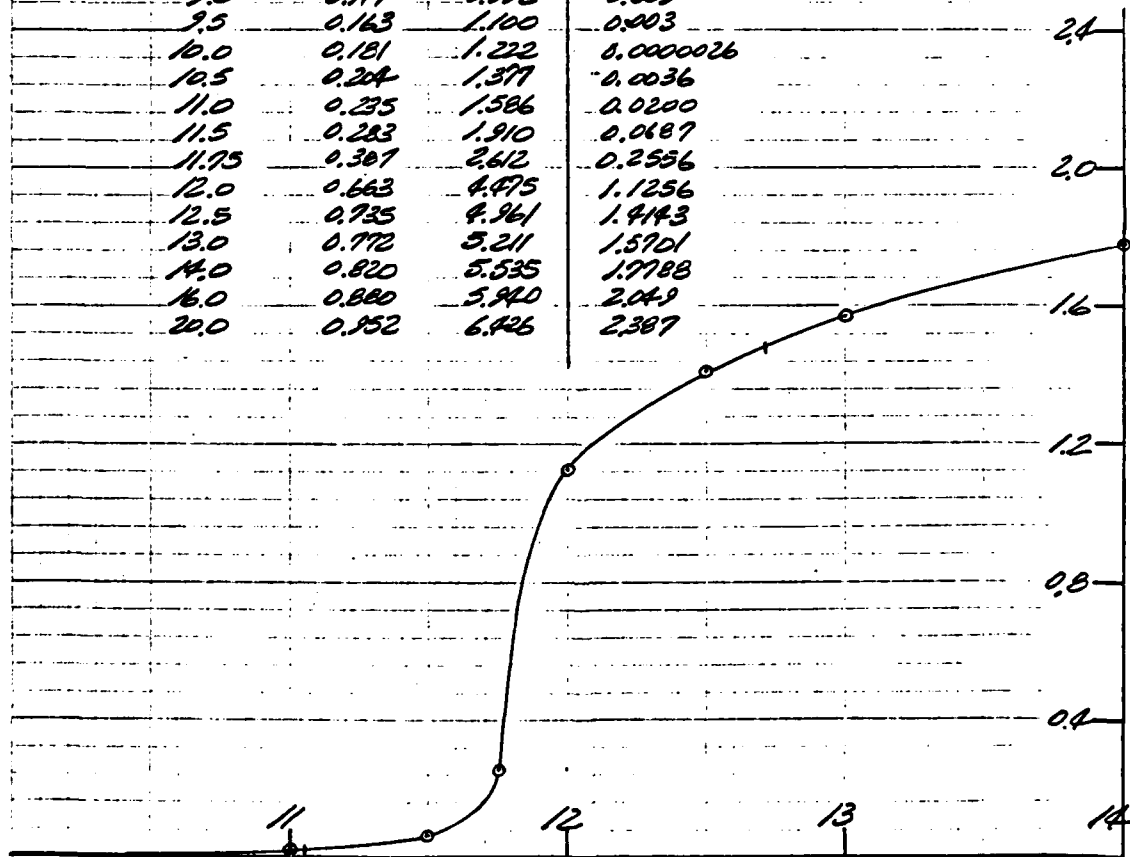
$$L_{24} = \frac{(4.200)^{.09} (6.129)^{.22}}{100^{.073}} = 4.15 \text{ hrs.}$$

$$\Delta D = 0.4L = 0.4(4.15 \text{ hrs.}) = 1.66 \text{ hrs.}$$

$$T_{WD} = 11.62 \text{ hrs.}$$

$$11.62 \text{ hrs.} - 4.5(1.66) = 4.4 \text{ hrs.}$$

Time (hrs.)	$P_{34}$ Peak	Mass P (inches)	Mass Q (inches)
4.0	0.048	0.324	0.135
6.0	0.080	0.540	0.086
8.0	0.120	0.810	0.030
9.0	0.147	0.992	0.009
9.5	0.163	1.100	0.003
10.0	0.181	1.222	0.0000026
10.5	0.204	1.377	0.0036
11.0	0.235	1.586	0.0200
11.5	0.283	1.910	0.0687
11.75	0.307	2.612	0.2556
12.0	0.663	4.475	1.1256
12.5	0.735	4.961	1.4143
13.0	0.772	5.211	1.5701
14.0	0.820	5.535	1.7788
16.0	0.880	5.940	2.049
20.0	0.952	6.426	2.387

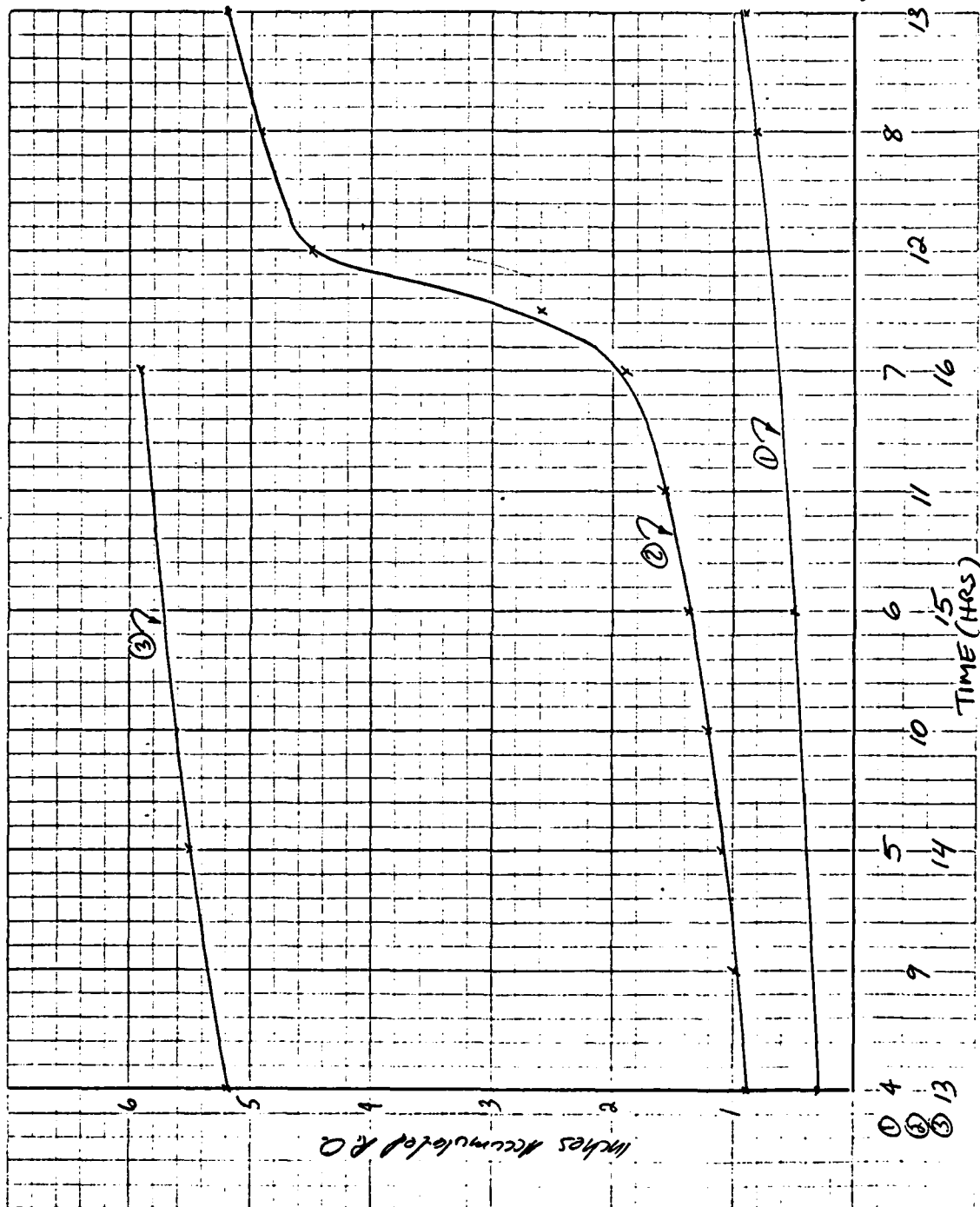


CAMP DRESSER & MCKEE  
Environmental Engineers  
Boston, Mass.

CLIENT COE  
PROJECT NEW POND  
DETAIL \_\_\_\_\_

JOB NO. 380-5-01  
DATE CHECKED \_\_\_\_\_  
CHECKED BY \_\_\_\_\_

PAGE 7  
DATE 16 Feb 79  
COMPUTED BY gcl



APPENDIX D-9

CAMP DRESSER & McKEE  
Environmental Engineers  
Boston, Mass.

CLIENT COE  
PROJECT NEW POND  
DETAIL \_\_\_\_\_

JOB NO. 300-5-01  
DATE CHECKED 2-16-77  
CHECKED BY Miller

PAGE 8  
DATE 16 Feb 77  
COMPUTED BY JW

100 yd Flow VIA SCS						
11.88 - 4.5 (1.66) = 4.41						
1	2	3	4	5	6	7
Increment	Time (hr)	Mass R.O. (in) <small>from curve</small>	$\Delta Q$ (in)	$\Delta g^*$ (cfs)	Y	Y( $\Delta g$ ) (cfs)
	4.41	.35				
$\Delta D_1$	6.07	.50	.15	29.7	.2	5.94
$\Delta D_2$	7.73	.75	.25	49.5	.4	19.80
$\Delta D_3$	9.39	1.05	.30	59.5	.6	35.70
$\Delta D_4$	11.05	1.58	.53	105.1	.8	84.08
$\Delta D_5$	12.71	5.05	3.47	688.0	1.0	688.00
$\Delta D_6$	14.37	5.60	.55	109.0	.73	72.67
$\Delta D_7$	16.03	5.90	.30	59	.73	19.67
						Q = 925.8 cfs
$* \Delta g = \frac{48 + A(\Delta Q)}{\frac{\Delta D}{2} + L} = \frac{(48 + (2.04)(\Delta Q))}{\left(\frac{1.66}{2}\right) + 4.15}$ $= 198.265 \Delta Q$						

# SURCHARGE - STORAGE ROUTING

@  $Q = 925 \text{ cfs}$   $el = 533.45$

Surcharge storage =  $\frac{533.45 - 531}{.0104} = 235 \text{ Ac-ft}$

$STOR_1 = \frac{(235)(12)}{1304 \text{ Ac}} = 2.17 \text{ in}$

$Q_{p2} = 925 \left(1 - \frac{2.17}{12}\right) = 570 \text{ cfs}$

@  $570 \text{ cfs}$   $el = 533.35$

Surcharge storage =  $\frac{533.35 - 531}{.0104} = 225 \text{ Ac-ft}$

$STOR_2 = \frac{(225)(12)}{1304} = 2.08 \text{ in}$

$STOR_{avg} = \frac{2.08 + 2.17}{2} = 2.12 \text{ in}$

$Q_{p3} = 900 \left(1 - \frac{2.12}{12}\right) = 581 \text{ cfs}$

@  $581 \text{ cfs}$   $el = 533.35$  OK

Top of Embankment 533

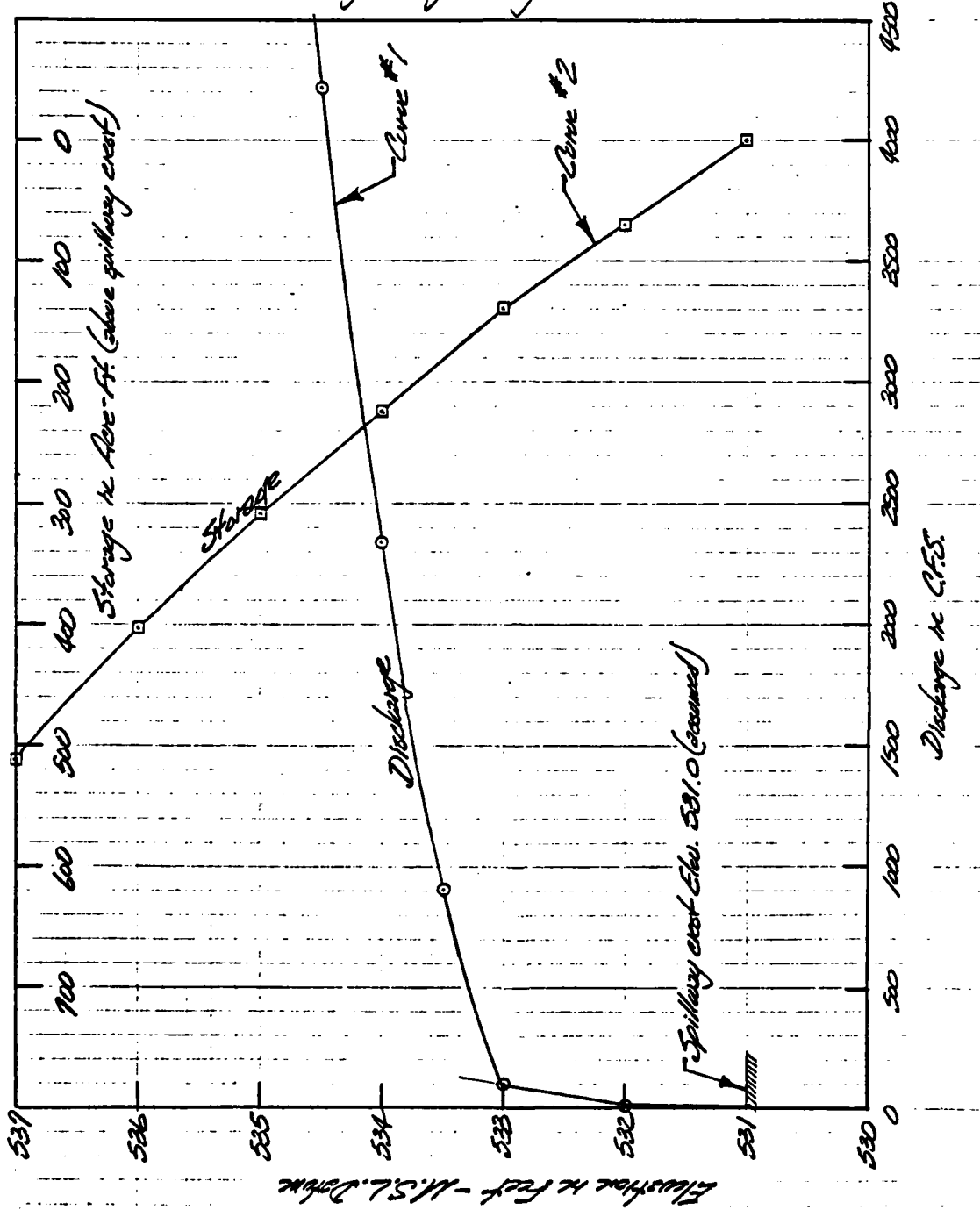
Surcharge El 533.35

100 yr Test Flood, after routing, would overtop dam by .35 ft (4.2 inches). As a practical matter, the spillway would be adequate for the 100 yr event. Technically, the spillway is inadequate.

CAMP DRESSER & MCKEE  
Environmental Engineers  
Boston, Mass.

CLIENT Cape of Engineers - Dan Hays JOB NO. 390-5-01  
PROJECT New Pond Dam DATE CHECKED \_\_\_\_\_  
DETAIL Surcharge Storage Rating CHECKED BY \_\_\_\_\_

PAGE 10  
DATE 2-12-79  
COMPUTED BY BT/ler



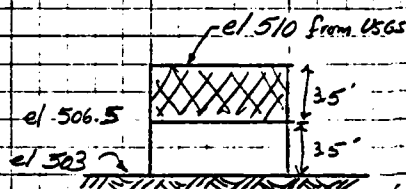
# TAILWATER ANALYSIS

Tailwater will be controlled by a storage area between New Pond and Oxford Rd. Mosquito Pond is located in this area.

@ el 503 Surface area = 8.7 acres = 0 Ac-ft  
el 510 = 30 acres = 192 Ac-ft  
520 = 65 acres = 627 Ac-ft

Develop Rating Curve for Culvert under Oxford Rd

2- 60' long 42"  $\phi$  ACP Culverts assume  $S=0.00035$



USE CMP Nomograph

$$\text{Weir flow} = CLH^{3/2} = (2.5)(500)(H)^{3/2} \\ = 1250(H)^{3/2}$$

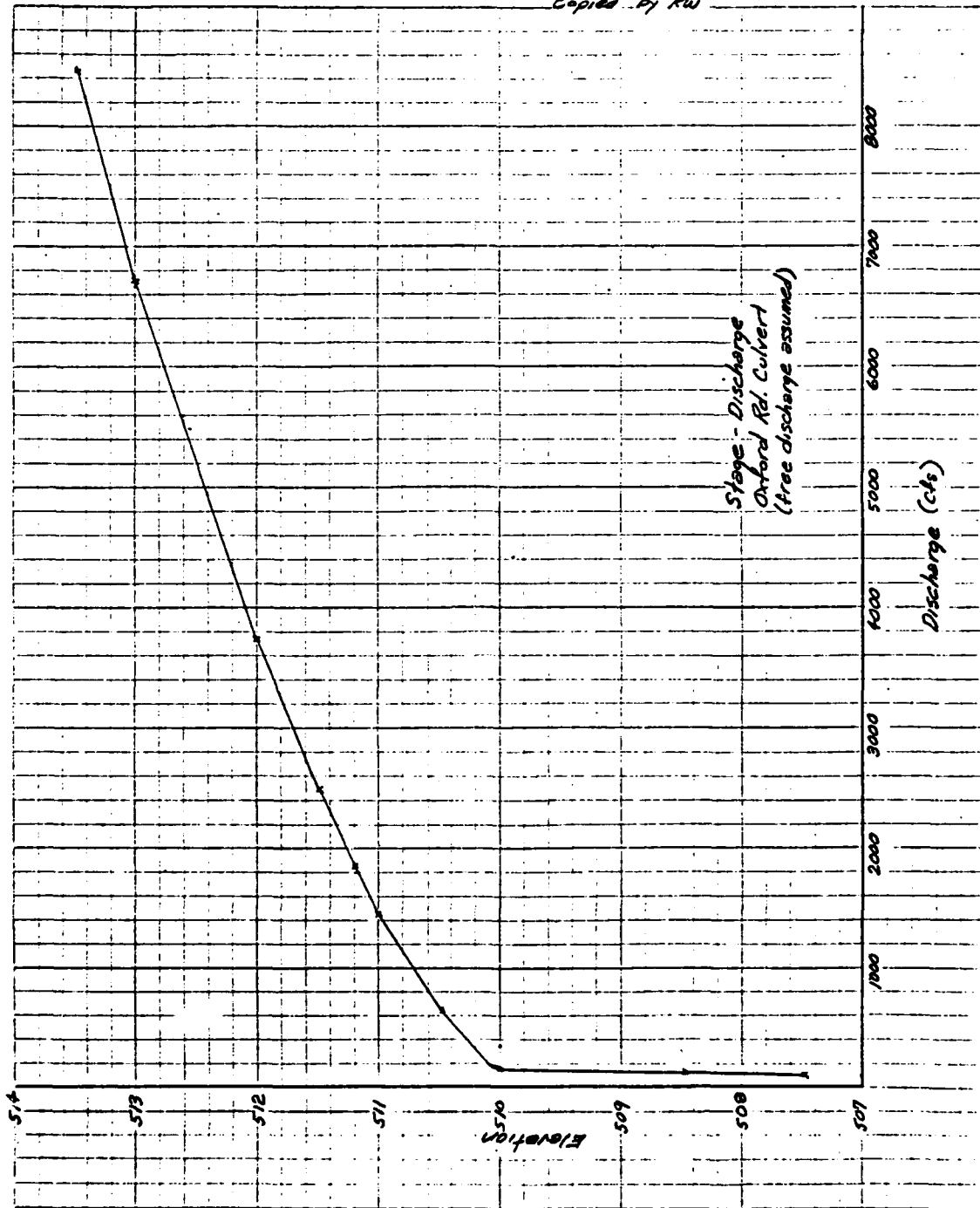
el	Q (from Nomograph)	2 pipes	Weir Q	Total Q
507	49.5 cfs	x 2	—	99 cfs
507.5	69 cfs	x 2	—	138
508.5	84 cfs	x 2	—	168
510	95 cfs	x 2	(1250)(.5) <sup>3/2</sup>	632
510.5	102 cfs	x 2	(1.0) <sup>3/2</sup>	1454
511	106 cfs	x 2	(1.2) <sup>3/2</sup>	1855
511.5	110 cfs	x 2	(1.5) <sup>3/2</sup>	2516
512	114 cfs	x 2	(2) <sup>3/2</sup>	3764
513	122 cfs	x 2	(3) <sup>3/2</sup>	6739
513.5	125 cfs	x 2	(3.5) <sup>3/2</sup>	8435
514	130 cfs	x 2	(4) <sup>3/2</sup>	10260
514.5	135 cfs	x 2	(4.5) <sup>3/2</sup>	12202

CAMP DRESSER & MCKEE  
Environmental Engineers  
Boston, Mass.

CLIENT Corps of Engineers  
PROJECT \_\_\_\_\_  
DETAIL New Pond

JOB NO. 380-5-01  
DATE CHECKED 1-12-79  
CHECKED BY CE Fuller  
Copied by RW

PAGE 12  
DATE 16 Feb 79  
COMPUTED BY JW



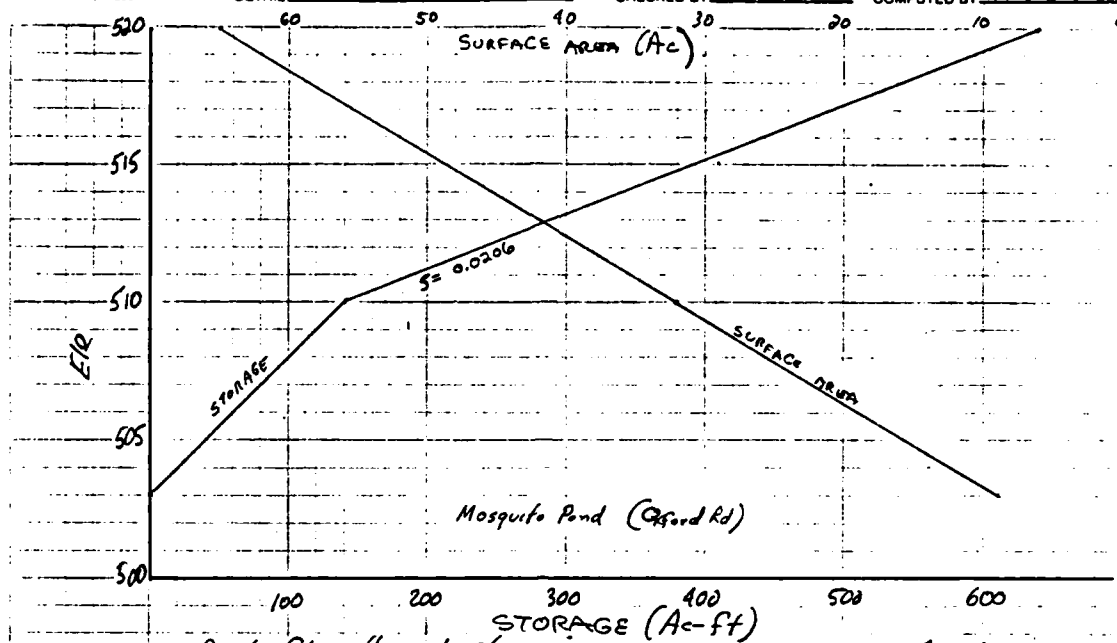
APPENDIX D-14

CAMP DRESSER & MCKEE  
Environmental Engineers  
Boston, Mass.

CLIENT COE  
PROJECT \_\_\_\_\_  
DETAIL NEW POND

JOB NO. 380-5-01  
DATE CHECKED 4-17-78  
CHECKED BY Miller

PAGE 13  
DATE 13 Oct 1978  
COMPUTED BY JG



Route Flow through Storage Area

STOR<sub>1</sub> = 4 inches

$$Q_p = 2000 \text{ cfs}$$

$$\text{Surcharge Ht to pass } Q_p = \text{el } 511.1 \quad \text{Vol of surcharge storage} = \frac{511.1 - 510}{0.0206} + 142 = 195 \text{ Ac-ft}$$

$$Q_p = 2000 \left(1 - \frac{1}{10}\right) = 1579 \text{ cfs}$$

$$\text{Surcharge Ht to pass } 1579 \text{ cfs} = \text{el } 510.8$$

$$\text{Vol of surcharge storage at el } 510.8 = \frac{510.8 - 510}{0.0206} + 142 = 180 \text{ Ac-ft}$$

$$\text{AVG STOR} = \frac{195 + 180}{2} = 188 \text{ Ac-ft}$$

$$\text{el} = (188 - 142)(0.0206) + 510 = 510.9$$

This elevation is well below toe elevation of spillway. Spillway is able to discharge freely.

Toe of dam at el 513.0. No information is available on down stream channel geometry. Based on topo map analysis and above analysis, the is no backwater expected to influence spillway discharge.



copied by R. W.

### Dam Failure Analysis

Assume dam fails in area of max. height  $L = 168'$   
Assume water elevation at failure elev 533

$$S = 440 \text{ Ac-ft. } W_b = .4(168) = 67 \quad Y_0 = 533 - 513 = 20'$$

$$Q_p = \frac{8}{27} W_b \sqrt{g} Y_0^{3/2} = \frac{8}{27} (67) (\sqrt{32.2}) (20)^{3/2} \approx 10,000 \text{ cfs}$$

First Reach: Dam to Oxford Rd

$$\text{for } Q_p, \text{ stage} = 513.9 \quad Y_0 / Y_1 = 340 \text{ Ac-ft.}$$

$$\text{trial } Q_{p2} = Q_p (1 - \frac{Y_1}{Y_0}) = 10000 (1 - \frac{340}{440}) = 2273 \text{ cfs}$$

$$\therefore Y_2 = 214 \text{ Ac-ft. } \text{Avg } Y_1 + Y_2 = \frac{(340 + 214)}{2} = 277 \text{ Ac-ft.}$$

$$Q_{p2} = 10,000 (1 - \frac{277}{440}) = 3705 \text{ cfs} \quad \text{elev 512.0 ft Oxford Rd elev 510 ft}$$

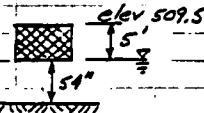
Flood may do minor damage to one house as it flows over Oxford Rd to Wallis Pond.

### Wallis Pond

Compute pressure flow via CMP Nomograph.

2 - 54"  $\phi$  CMP Pipes 45' long

$$(2)(200) = 400 \text{ cfs}$$



Flow culverts can pass w/o overtopping Charlton Rd.

From topo map: Storage available in Wallis Pond is about double that provided by Mosquito Pond.

$$Q = 3705 \text{ cfs} \quad \text{stage} = 506.5 \text{ in Wallis Pond}$$

$$\text{Assume can store } 3' \text{ to elev. } 509.5 \quad (3 \text{ loc})(3)2 = 186 \text{ Ac-ft}$$

$$Q_{p3} = 3705 (1 - \frac{186}{440}) = 2139 \text{ cfs}$$

Flow overtops Charlton Rd for a length of about 1000 ft.

$$2139 - 400 = 1739 \text{ cfs in weir flow } H = \sqrt[3]{\frac{Q^2}{CL}} = \sqrt[3]{\frac{1739^2}{2.5(1000)}} = 0.8 \text{ ft.}$$

No structures are disturbed as  $Q$  flows into Lerner Pond. Storage available in Lerner Pond is a bit greater than that available in Wallis Pond. No data is available on dams on Lerner Pond. However, from previous analysis on upstream ponds, it is assumed enough storage is available in Lerner Pond to contain and abate the remaining dam failure flow with no damage to be expected further downstream.

APPENDIX E  
INFORMATION AS CONTAINED IN  
THE NATIONAL INVENTORY OF DAMS

AD-A145 347

NATIONAL PROGRAM FOR INSPECTION OF NON-FEDERAL DAMS NEW 2/2  
POND DAM (MA 0011 (U) CORPS OF ENGINEERS WALTHAM MA  
NEW ENGLAND DIV MAR 79

UNCLASSIFIED

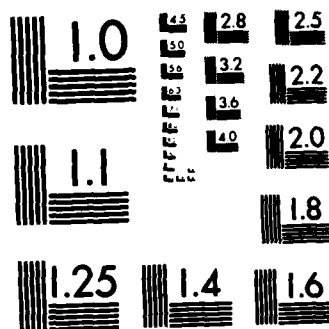
F/G 13/13 NL



END

FORMED

DTIC



MICROCOPY RESOLUTION TEST CHART  
NATIONAL BUREAU OF STANDARDS-1963-A

# LE

POPULAR NAME	NAME OF IMPOUNDMENT
HAYDEN POND	NEW POND

TYPE OF DAM	YEAR COMPLETED	PURPOSES	STRUCT. HEIGHT	HYDRAU. HEIGHT	IMPOUNDING CAPACITIES	
					MAXIMUM TAEN = FT.	NORMAL TAEN = FT.
WRECKING	1900	K	20	20	500	300

REMARKS
21-101

(9)	(8)	(7)	(6)	(5)	(4)	(3)	(2)	(1)
D/S HAS	SPILLWAY		MAXIMUM DISCHARGE (FT.)		VOLUME OF DAM (CY)	POWER CAPACITY INSTALLED (KW)		NAVIGATION LOCKS
CROSS LENGTH	CROSS TYPE	WIDTH						
3	670	11	29		100			

(c)	(d)	(e)
OWNER	ENGINEERING BY	CONSTRUCTION BY
STEVENS LINEN ASSOC INC		

REGULATORY AGENCY			
DESIGN	CONSTRUCTION	OPERATION	MAINTENANCE
NONE	NONE	NONE	NONE

INSPECTION BY	INSPECTION DATE		AUTHORITY FOR INSPECTION
	DAY	MO YR	
CAMP DWESSER AND MCKEE INC	20	SEP 78	PL 92-367

REMARKS



DEPARTMENT OF THE ARMY  
NEW ENGLAND DIVISION, CORPS OF ENGINEERS  
424 TRAPELO ROAD  
WALTHAM, MASSACHUSETTS 02154

REPLY TO  
ATTENTION OF:

NEDED

MAY 29 1979

Honorable Edward J. King  
Governor of the Commonwealth of  
Massachusetts  
State House  
Boston, Massachusetts 02133

Dear Governor King:


I am forwarding to you a copy of the New Pond Dam Phase I Inspection Report, which was prepared under the National Program for Inspection of Non-Federal Dams. This report is presented for your use and is based upon a visual inspection, a review of the past performance and a brief hydrological study of the dam. A brief assessment is included at the beginning of the report. I have approved the report and support the findings and recommendations described in Section 7 and ask that you keep me informed of the actions taken to implement them. This follow-up action is a vitally important part of this program.

A copy of this report has been forwarded to the Department of Environmental Quality Engineering, the cooperating agency for the Commonwealth of Massachusetts. In addition, a copy of the report has also been furnished the owner, Stevens Linen Associates, Inc., Box 220, Webster, Massachusetts 01570, ATTN: Mr. Robert Javery, Plant Engineer.

Copies of this report will be made available to the public, upon request, by this office under the Freedom of Information Act. In the case of this report the release date will be thirty days from the date of this letter.

I wish to take this opportunity to thank you and the Department of Environmental Quality Engineering for your cooperation in carrying out this program.

Sincerely yours,

  
JOHN P. CHANDLER  
Colonel, Corps of Engineers  
Division Engineer

Incl  
As stated



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NEW ENGLAND DIVISION, CORPS OF ENGINEERS  
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Dear Governor King:

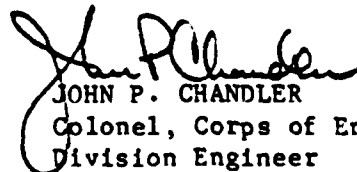
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Sincerely yours,

  
JOHN P. CHANDLER  
Colonel, Corps of Engineers  
Division Engineer

Incl  
As stated





DEPARTMENT OF THE ARMY  
NEW ENGLAND DIVISION, CORPS OF ENGINEERS  
424 TRAPELO ROAD  
WALTHAM, MASSACHUSETTS 02154

REPLY TO  
ATTENTION OF:  
NEDED-E

MAY 29 1979

Mr. Anthony D. Cortese, Commissioner  
Department of Environmental Quality  
Engineering  
Commonwealth of Massachusetts  
100 Cambridge Street  
Boston, Massachusetts 02202

Dear Commissioner Cortese:

Forwarded herewith for your information and use is a copy of the Inspection Report on New Pond Dam. This inspection was performed in accordance with Public Law 92-367 under the direction of the Corps of Engineers. Copies of the finished report have been forwarded to the Governor and the owner. We thank you for your cooperation and assistance in carrying out this program and hope this report will help you to develop an effective dam safety program.

Sincerely yours,

A handwritten signature in cursive script, reading "Joe E. Fryar".

JOE E. FRYAR  
Chief, Engineering Division

Incl  
As stated



DEPARTMENT OF THE ARMY  
NEW ENGLAND DIVISION, CORPS OF ENGINEERS  
424 TRAPELO ROAD  
WALTHAM, MASSACHUSETTS 02154

REPLY TO  
ATTENTION OF:  
NEDED-E

MAY 29 1979

Mr. Robert Javery, Plant Engineer  
Stevens Linen Associates, Inc.  
Box 220  
Webster, Massachusetts 01570

Dear Mr. Javery:

Forwarded herewith for your information and use is a copy of the Inspection Report on the New Pond Dam. This inspection was made under the authority of Public Law 92-367 by the firm of Camp, Dresser & McKee, Inc., Boston, Massachusetts under the direction and supervision of the Corps of Engineers. Copies of the finished report have been forwarded to the Governor and the Department of Environmental Quality Engineering, the cooperating agency for the Commonwealth of Massachusetts.

Section 7 of the report contains an evaluation and recommendations. If you have any questions concerning this report, we suggest that you contact the Department of Environmental Quality Engineering first. Then, if there are further questions contact the Project Management Branch, Engineering Division of this office. We thank you for your cooperation and assistance in carrying out this program.

Sincerely yours,

A handwritten signature in cursive script, reading "Joe B. Fryar", is written over the typed name.

JOE B. FRYAR  
Chief, Engineering Division

Incl  
As stated